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Endodontic treatment procedures applied by endodontists and general dentists in Turkiye: a questionnaire survey

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ABSTRACT

Aims: The aim of this study is to determine the use of rubber dams, magnification techniques, working length measurement methods, and preferences for multiple sessions among endodontists and general dental practitioners performing root canal treatment in Turkiye, as well as to evaluate disinfection and obturation protocols.

Methods: In this study, 167 dentists working in Turkiye were included, and they were asked to respond to a questionnaire consisting of 17 questions covering gender, the institution they work at, specialty, the years they have been practicing, and information related to the stages of root canal treatment. The data obtained from this study were analyzed using the chi-square test, Fisher's exact test, and Pearson chi-square test, based on the number of observations in the tables.

Results: Of the participants in the study, 53.89% reported attending any seminar/course related to endodontics after graduation. Additionally, 43.71% of the participants perform more than 30 root canal treatments per month. Notably, 91.02% of the participants typically perform root canal treatments on molar teeth. However, 77.25% of the participants do not use rubber dams during treatment, and 91.02% do not utilize magnification during root canal procedures. There is a statistically significant relationship between titles and the frequency of performing root canal treatments ($p<0.05$). Among the endodontists, 85.71% perform more than 30 root canal treatments per month, while 37.67% of general dental practitioners do the same; conversely, 18.49% of general dentists perform between 0-10 root canal treatments per month. Furthermore, there is a statistically significant relationship between titles and the use of rubber dams during root canal treatments ($p<0.05$). While 38.1% of endodontists and 82.88% of general dental practitioners do not use rubber dams during treatment, 14.29% of endodontists and 2.05% of general dentists always use rubber dams. Lastly, there is also a statistically significant relationship between titles and the utilization of magnification during treatment ($p<0.05$). While 76.19% of endodontists and 93.15% of general dental practitioners do not utilize magnification during treatment, 0.68% of general dentists occasionally use loupes or smartphone cameras for assistance.

Conclusion: As a result of this study, it was seen that general dentists have sufficient knowledge about root canal protocols and materials. It was also seen that endodontists have relatively more knowledge on this subject than general dentists.

Keywords: Endodontist, root canal treatment, general dental practitioners, education, dentistry

INTRODUCTION

Root canal treatment is a treatment method applied to eliminate pathogens in the canals and improve existing pathologies in order to prevent early tooth loss.[1] Although the success rate of root canal treatment is high, the application of the treatment requires a certain level of knowledge, necessary materials and time.[2]

Rubber dam, which has been used for 150 years for isolating the tooth during root canal treatment, is still considered the most ideal method for isolation.[3] According to Silversin et al.,[4] all endodontic applications should be performed under rubber dam isolation and rubber dam application should be accepted as the gold standard. In addition to providing adequate oropharyngeal protection, rubber dam isolation should be used for infection control and the success of root canal treatment.[5]

Determination of working length is one of the most critical steps in root canal treatment and a clear understanding of the morphology of the root canal system including the root apex is essential. Apical constriction has been proposed as an ideal apical termination for root canal preparation. It is the part of the canal with the smallest diameter and any violation of this area is not recommended for long-term, successful results.[6,7] Determination of working length is done by different methods. These methods include finger sensitivity, electronic apex locator (EAL), radiographic method and moisture in paper cones, cone beam computed tomography (CBCT).[8]

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Endodontics is limited to a narrow field of study because it deals with very small anatomies. Over the years, many magnifying devices have been introduced as tools that bridge the gap between the naked eye and the microscope. Today, tools such as endoscopes, magnifying glasses (loupes) and intraoral cameras have largely been replaced by more practical and convenient devices for practice such as magnifying glasses (loupes) and operating microscopes.[9,10]

Technological and methodological changes aimed at improving endodontic treatment outcomes can be categorized into two main areas. One area of technological advancement has been root canal preparation itself, accompanied by the advancement of appropriate instrumentation, from stainless steel hand files[11] to rotary nickel-titanium multi-file systems[12] and alternative machine-driven single-file systems.[13]

Since microorganisms are difficult to eradicate from infected root canals, a number of methods have been used to reduce their numbers, including various instrumentation techniques, irrigation regimens, and intracanal medicaments.[14,15]

Since stainless steel hand files have been the preferred method for many years, there are data on the long-term results of endodontic treatment.[16,17] After NiTi alloys, the popularity of reciprocating motion systems has increased. This development indicates that the instruments require five rotations to complete a full 360° rotation. At the same time, the elastic limit of the instrument is not exceeded due to this movement.[18] Studies suggest the use of NiTi alloys with endodontic motors by taking advantage of their mechanical properties such as superelasticity and shape memory.[19-21]

Some of the irrigation solutions used in root canal treatment are: sodium hypochlorite (NaOCl), ethylenediamine tetraacetic acid (EDTA), chlorhexidine (CHX), distilled water, physiological serum, ozonated water, citric acid.[22]

Another area of progress is characterized by the establishment of effective intracanal disinfection protocols, from syringe irrigation with NaOCl to passive ultrasonic irrigation (PUI).[23] Traditional syringe irrigation is a widely accepted technique. Traditional syringe irrigation technique may fail to effectively deliver and distribute irrigants in the root canal system, especially in the apical third and isthmus regions.[24] Activation in root canal irrigation is the process of using mechanical, physical or other forms of energy to increase the effectiveness of irrigants within the root canal system. Currently, there are automated systems and manual methods for irrigation activation. Among the different activation methods, manual dynamic activation (MDA), PUI and sonic irrigation (SI) are some of the most widely used and studied methods.[25] The null hypothesis was that there is no difference in the path followed by endodontists and general dentists in root canal treatment. The aim of this study was to determine the rubber dam, magnification use, working length detection method and multi-session preference of endodontists and general dental practitioners performing root canal treatment in Turkiye, and also to evaluate disinfection and obturation protocols.

METHODS

Ethics committee approval was given by the Dicle University Faculty of Dentistry Ethics Committee (Date: 29.01.2020, Decision No: 2020-2). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The survey questions were prepared on an internet platform (Google forms) that provides survey services. The link that provides access to the survey form was shared only on various social platforms where dentists are present between March 2023 and April 2023. The responses of 167 people who completed all the questions of the survey were included in the study. Incomplete surveys were not included in the study. A total of 167 people, 21 endodontists and 146 general dental practitioners working in Turkiye, participated in this study. Participation in the survey is voluntary. **Table 1** shows the survey questions presented to participants.

Statistical Analysis

The data obtained in this study were analyzed with SPSS software version 21 (IBM SPSS Inc., Armonk, NY, USA) package program. Descriptive statistics are stated in the form of frequency and percentage [n (%)]. Chi-square analysis was applied to nominal variables, Fisher's exact test was applied to 2x2 tables and Pearson chi-square analysis was applied to RxC tables with the help of Monte Carlo simulation. Since 20% of the expected value in the cells was less than 5, chi-square analysis was performed with the help of Monte Carlo simulation. The significance level was determined as $p<0.05$.

RESULTS

167 dentists who participated in our survey answered the questions. Of the 167 people, 21 (12.57%) were endodontists and 146 (87.43%) were general dental practitioners. 47.9% of the participating dentists worked in private clinics, 34.13% in ODHC, and 17.96% in university hospitals. In the study, 51.5% had worked for 0-5 years, 20.96% for 6-10 years, 11.38% for 11-15 years, and 16.17% for over 16 years, and 53.89% of these dentists had attended any seminar/course related to endodontics after graduation (**Table 2**).

43.71% of the participants reported that they performed more than 30 root canal treatments per month and 91.02% of the dentists usually performed root canal treatments on molar group teeth. 77.25% of the participants reported that they did not use rubber dams during treatment, 91.02% did not use magnification during treatment, 56.89% did not use gel-type lubricants during treatment, and 74.25% did not use activation techniques during irrigation. Of those who used activation techniques during irrigation, 41.86% reported that they used PUI activation techniques during irrigation.

62.28% of the participants reported using the radiography+EAL technique to determine working length, 88.02% reported using NiTi rotary files in routine root canal treatment, 95.81% used NaOCl/diluted NaOCl as an irrigation solution, 52.1% employed the lateral condensation filling technique, 43.11% used epoxy resin-based canal filling, and 82.63% preferred composite filling restoration after endodontic treatment. Additionally, 52.69% of dentists stated they completed root canal treatment in a single session, while 47.31% completed it in multiple sessions. Among those who completed root canal treatment in multiple sessions, 97.44% indicated they used CaOH as an intra-canal medicament (**Table 3**).

There is a statistically significant relationship between titles (endodontist and general dental practitioners) and the institutions they work in ($p<0.05$). While 23.81% of endodontists and 51.37% of general dental practitioners

Table 1. Survey questions

In which type of institution do you work?
Private clinic
Oral and dental health center
University hospital
What is your title?
Endodontists
General dental practitioners
How many years have you been working as a dentist?
1-5 years
6-10 years
11-15 years
16+ years
Have you attended any seminars/courses related to endodontics after graduation?
Yes
No
How often do you perform endodontic treatment?
1-10 per month
11-20 per month
21-30 per month
31 or more per month
Which group of teeth do you mostly treat?
Incisors
Premolar teeth
Molar teeth
Do you use rubber dam when performing root canal treatment?
Always
Most of the time
Sometimes
I don't use it
Do you use magnification when performing root canal treatment?
No
Loupe
Dental microscope
Other….
How do you determine the working length in root canal treatment?
With radiography
With an electronic apex locator
With radiography and an electronic apex locator
What files do you use in routine root canal treatment?
K type file
H type file
Ni Ti hand files
Ni Ti rotary files
Which of the following do you use as an irrigation agent while performing root canal treatment?
NaOCl
EDTA
Chlorhexidine
Other….
Which activation technique do you use during irrigation?
I do not use
Endoactivator
Passive ultrasonic irrigation
Other…
How many sessions do you complete for root canal treatment?
Single session
Multiple sessions
If you perform multiple-session root canal treatment, which intra-canal medicament do you use between sessions?
CaOH
Two-component antibiotic paste
Three-component antibiotic paste
Other…
Which filling technique do you use?
Single cone technique
Lateral condensation
Hot vertical condensation
Hot lateral condensation
Continuous heat obturation
Which restoration do you prefer after endodontic treatment?
Composite filling
Amalgam filling
Crown
Which canal filling material do you use?
Epoxy resin-based canal filling
Bioceramic-based canal filling
Calcium hydroxide-containing canal filling
Zinc oxide eugenol-containing canal filling

EDTA: Etilendiamine tetraaceticacid

Table 2. Frequency distribution table

		n	%
In which type of institution do you work?	Private clinic	80	47.9
	Oral and dental health center	57	34.13
	University hospital	30	17.96
	Total	167	100
What is your title?	Endodontist	21	12.57
	General dental practitioners	146	87.43
	Total	167	100
How many years have you been working as a dentist?	0-5	86	51.5
	6-10	35	20.96
	11-15	19	11.38
	16<	27	16.17
	Total	167	100
Have you attended any seminars/ courses related to endodontics after graduation?	Yes	90	53.89
	No	77	46.11
	Total	167	100
How often do you perform endodontic treatment? (per month)	0-10	27	16.17
	11-20	39	23.35
	21-30	28	16.77
	30<	73	43.71
	Total	167	100
Which group of teeth do you mostly treat?*	Incisors	69	41.32
	Premolar teeth	81	48.50
	Molar teeth	152	91.02
Do you use rubber dam when performing root canal treatment?	Always	6	3.59
	Most of the time	7	4.19
	Sometimes	25	14.97
	I don't use it	129	77.25
	Total	167	100
Do you use magnification when performing root canal treatment?	No	152	91.02
	Loupe	12	7.19
	Dental microscope	2	1.2
	Sometimes a magnifying glass, a phone camera	1	0.6
	Total	167	100
How do you determine the working length in root canal treatment?	With radiography	35	20.96
	With an electronic apex locator	28	16.77
	With radiography and an electronic apex locator	104	62.28
	Total	167	100
What files do you use in routine root canal treatment?*	K type file	104	62.28
	H type file	75	44.91
	Ni Ti hand files	32	19.16
	Ni Ti rotary files	147	88.02
Do you use gel type lubricant during the procedure?	Yes	72	43.11
	No	95	56.89
	Total	167	100
Which of the following do you use as an irrigation agent while performing root canal treatment?*	NaOCl	160	95.81
	EDTA	109	65.27
	CHX	91	54.49
	Distilled water	12	7.19
	Physiological saline	20	11.98
	Oseptin/octenidine	3	1.80
	Ethyl alcohol	1	0.60
	Hydrogen peroxide/H2O2	3	1.80
Do you use activation techniques during the irrigation process?	Yes	43	25.75
	No	124	74.25
	Total	167	100
Which activation technique do you use during irrigation?	Endoactivator	11	25.58
	Irrigating with a syringe	1	2.33
	Gutta percha activation	9	20.93
	Lentulo	1	2.33
	Manual dynamic activation	2	4.65
	Heated NaOCl	1	2.33
	Passive ultrasonic irrigation	18	41.86
	Total	43	100
How many sessions do you complete for root canal treatment?	Single session	88	52.69
	Multiple session	79	47.31
	Total	167	100
If you perform multiple-session root canal treatment, which intra-canal medicament do you use between sessions?	Two-component antibiotic paste	1	1.28
	Phenol	1	1.28
	CaOH	76	97.44
	Total	78	100
Which filling technique do you use?	Single cone technique	78	46.71
	Lateral condensation	87	52.1
	Hot filling technique	2	1.2
	Total	167	100
Which restoration do you prefer after endodontic treatment?	Amalgam filling	14	8.38
	Composite filling	138	82.63
	Crown	15	8.98
	Total	167	100
Which canal filling material do you use?	Bioceramic-based canal filling	19	11.38
	Zinc oxide eugenol-containing canal filling	12	7.19
	Epoxy resin-based canal filling	72	43.11
	Calcium Hydroxide-containing canal filling	64	38.32
	Total	167	100

*Multiple answer options have been selected, EDTA: Etilendiamine tetraaceticacid

Table 3. Chi-square test results regarding the relationship between titles and demographic information

		Title						Chi-square test	
		Endodontist		General dental practitioners		Total			
		n	%	n	%	n	%	Chi-square	p
In which type of institution do you work?	Private clinic	5	23.81	75	51.37	80	47.9	38.889	0.001
	Oral and dental health center	2	9.52	55	37.67	57	34.13		
	University hospital	14	66.67	16	10.96	30	17.96		
	Total	21	100	146	100	167	100		
How many years have you been working as a dentist?	0-5	10	47.62	76	52.05	86	51.5	*	0.567
	6-10	5	23.81	30	20.55	35	20.96		
	11-15	4	19.05	15	10.27	19	11.38		
	16<	2	9.52	25	17.12	27	16.17		
	Total	21	100	146	100	167	100		
Have you attended any seminars/courses related to endodontics after graduation?	Yes	13	61.9	77	52.74	90	53.89	0.307	0.58
	No	8	38.1	69	47.26	77	46.11		
	Total	21	100	146	100	167	100		

work in private clinics, 66.67% of endodontists and 10.96% of general dental practitioners work in university hospitals.

There is no statistically significant relationship between titles and years of practice, participation in any seminar/course related to endodontics after graduation, groups of teeth receiving root canal treatment, techniques used to determine working length, files used in routine root canal treatment, irrigation solutions used, use of activation techniques during irrigation, use of gel-type lubricants during treatment, filling techniques employed, canal filling materials used, intra-canal medicaments used between sessions in multiple-session root canal treatments, and preferred restorations after endodontic treatment ($p>0.05$).

There is a statistically significant relationship between titles and the frequency of performing root canal treatments ($p<0.05$). While 85.71% of endodontists and 37.67% of general dental practitioners perform more than 30 root canal treatments per month, 18.49% of general dental practitioners perform between 0-10 root canal treatments per month.

Additionally, there is a statistically significant relationship between titles and the use of rubber dam during treatment ($p<0.05$). While 38.1% of endodontists and 82.88% of general dental practitioners do not use rubber dam during treatment, 14.29% of endodontists and 2.05% of general dental practitioners always use rubber dam during treatment.

There is a statistically significant relationship between titles and the use of magnification during procedures ($p<0.05$). While 76.19% of endodontists and 93.15% of general dental practitioners do not use magnification during treatment, 0.68% of general dental practitioners sometimes use a magnifying glass or phone camera during treatment.

Additionally, there is a statistically significant relationship between titles and the number of sessions required to complete root canal treatment ($p<0.05$). While 80.95% of endodontists and 48.63% of general dental practitioners complete root canal treatment in a single session, 19.05% of endodontists and 51.37% of general dental practitioners complete it in multiple sessions (**Table 4**).

DISCUSSION

Root canal treatment is a proven procedure, but many factors can affect its success. In our country, the number of endodontic specialists is steadily increasing, and technological advancements are leading to the development of various procedures for the application of root canal treatment.

In the study conducted by Ünal et al.,[26] the average number of root canal treatments performed by participating dentists in a month was examined. The study also indicated that dental practice in our country is predominantly carried out by general dental practitioners, particularly due to the insufficient number of endodontists, resulting in endodontic treatments being performed by dentists working in both the public and private sectors. In the study by Ferreira et al.,[27] it was reported that the number of endodontic treatments per month (82%) of endodontists was more than 11. 43.71% of the participants in our study performed more than 30 root canal treatments per month. There was a statistically significant relationship between the titles (endodontists and general practitioners) and the frequency of performing root canal treatments. While 85.71% of endodontists and 37.67% of general dental practitioners performed more than 30 root canal treatments per month, 18.49% of general dental practitioners performed 0-10 root canal treatments per month. There was a statistically significant relationship between the titles and the institutions they worked at. While 23.81% of endodontists and 51.37% of general dental practitioners worked in private clinics, 66.67% of endodontists and 10.96% of general dental practitioners worked in university hospitals. We believe that the reason for this is the increasing number of new universities and dental faculties in our country.

In a survey study conducted by Dindar et al.,[28] it was found that dentists more frequently treat molar teeth (77.96%) in their routine endodontic practice. The frequency of treating molar teeth among dentists with more than 16 years of professional experience was significantly lower compared to those with 1-5 years and 6-15 years of experience. In our study, 91.02% of the participating dentists reported that they typically perform root canal treatment on molar group teeth. Additionally, there is no statistically significant relationship between titles and years of practice. In a study conducted by Ünlü et al.,[29] it was reported that preventive dentistry has not been fully established in our country and that molar teeth tend to decay within a few years after eruption. We believe that this rate is high because permanent molars are the first teeth to erupt in the mouth and preventive dentistry is not widespread in our country.

Table 4. Chi-square test results regarding the relationship between titles and other parameters

		Title						Chi-square test	
		Endodontist		General dental practitioners		Total			
		n	%	n	%	n	%	Chi-square	p
How often do you perform endodontic treatment? (per month)	0-10	0	0	27	18.49	27	16.17	*	0.001
	11-20	0	0	39	26.71	39	23.35		
	21-30	3	14.29	25	17.12	28	16.77		
	30<	18	85.71	55	37.67	73	43.71		
	Total	21	100	146	100	167	100		
Which group of teeth do you mostly treat?	Molar teeth	21	100	131	89.73	152	91.02	Fisher's exact	0.221
	Other	0	0	15	10.27	15	8.98		
	Total	21	100	146	100	167	100		
Do you use rubber dam when performing root canal treatment?	Always	3	14.29	3	2.05	6	3.59	*	0.001
	Most of the time	1	4.76	6	4.11	7	4.19		
	Sometimes	9	42.86	16	10.96	25	14.97		
	I don't use it	8	38.1	121	82.88	129	77.25		
	Total	21	100	146	100	167	100		
Do you use magnification when performing root canal treatment?	No	16	76.19	136	93.15	152	91.02	*	0.006
	Loupe	3	14.29	9	6.16	12	7.19		
	Dental microscope	2	9.52	0	0	2	1.2		
	Sometimes a magnifying glass, a phone camera	0	0	1	0.68	1	0.6		
	Total	21	100	146	100	167	100		
How do you determine the working length in root canal treatment?	With radiography	2	9.52	33	22.6	35	20.96	*	0.187
	With an electronic apex locator	6	28.57	22	15.07	28	16.77		
	With radiography and an electronic apex locator	13	61.9	91	62.33	104	62.28		
	Total	21	100	146	100	167	100		
What files do you use in routine root canal treatment?	Ni Ti rotary files	20	95.24	127	86.99	147	88.02	Fisher's exact	0.474
	Other	1	4.76	19	13.01	20	11.98		
	Total	21	100	146	100	167	100		
Do you use gel type lubricant during the procedure?	Yes	6	28.57	66	45.21	72	43.11	1.449	0.229
	No	15	71.43	80	54.79	95	56.89		
	Total	21	100	146	100	167	100		
Which of the following do you use as an irrigation agent while performing root canal treatment?	NaOCl/diluted NaOCl	21	100	139	95.21	160	95.81	Fisher's exact	0.598
	Other	0	0	7	4.79	7	4.19		
	Total	21	100	146	100	167	100		
Do you use activation techniques during the irrigation process?	Yes	9	42.86	34	23.29	43	25.75	2.725	0.099
	No	12	57.14	112	76.71	124	74.25		
	Total	21	100	146	100	167	100		
Which activation technique do you use during irrigation?	Endoactivator	3	33.33	8	23.53	11	25.58	*	0.99
	Irrigating with a syringe	0	0	1	2.94	1	2.33		
	Gutta percha activation	2	22.22	7	20.59	9	20.93		
	Lentulo	0	0	1	2.94	1	2.33		
	Manual dynamic activation	0	0	2	5.88	2	4.65		
	Heated NaOCl	0	0	1	2.94	1	2.33		
	Passive ultrasonic irrigation	4	44.44	14	41.18	18	41.86		
	Total	9	100	34	100	43	100		
How many sessions do you complete for root canal treatment?	Single session	17	80.95	71	48.63	88	52.69	6.452	0.011
	Multiple session	4	19.05	75	51.37	79	47.31		
	Total	21	100	146	100	167	100		
If you perform multiple-session root canal treatment, which intra-canal medicament do you use between sessions?	Two-component antibiotic paste	0	0	1	1.35	1	1.28	*	0.99
	Phenol	0	0	1	1.35	1	1.28		
	CaOH	4	100	72	97.3	76	97.44		
	Total	4	100	74	100	78	100		
Which filling technique do you use?	Single cone technique	7	33.33	71	48.63	78	46.71	*	0.135
	Lateral condensation	13	61.9	74	50.68	87	52.1		
	Hot filling technique	1	4.76	1	0.68	2	1.2		
	Total	21	100	146	100	167	100		
Which restoration do you prefer after endodontic treatment?	Amalgam filling	0	0	14	9.59	14	8.38	*	0.308
	Composite filling	18	85.71	120	82.19	138	82.63		
	Crown	3	14.29	12	8.22	15	8.98		
	Total	21	100	146	100	167	100		
Which canal filling material do you use?	Bioceramic-based canal filling	4	19.05	15	10.27	19	11.38	*	0.144
	Zinc oxide eugenol-containing canal filling	0	0	12	8.22	12	7.19		
	Epoxy resin-based canal filling	12	57.14	60	41.1	72	43.11		
	Calcium hydroxide-containing canal filling	5	23.81	59	40.41	64	38.32		
	Total	21	100	146	100	167	100		

In a survey study, it was reported that 81.15% of dentists never use rubber dam, 0.64% always use it.[28] Similarly, another study conducted in Denmark found that 14% of dentists reported sometimes using rubber dam.[30] In a study by Ferreira et al.,[27] it was found that 99% of endodontists use rubber dam. In our study, 77.25% of participants reported not using rubber dam during root canal treatment. The low rate of rubber dam usage can be attributed to the difficulty and duration of application, as well as cost. We believe that the low rate of rubber dam usage in our country significantly reduces the prognosis of the endodontic treatments performed.

Wong et al.[31] reported that 67.8% of dentists do not use magnification, while 30.4% use loupes and 6.2% use a microscope. Another study showed that 86.5% of dentists do not use any magnification devices, 13.18% use loupes, and only 1 dentist uses a microscope.[28] In a further study, it was found that 67.38% of endodontists use magnification, with the magnification tools being 23.66% loupes, 35.48% microscopes, and 8.24% using a combination of both.[27] In our study, 91.02% of participants reported that they do not utilize magnification during root canal treatment. While 76.19% of endodontists and 93.15% of general dental practitioners do not use magnification during treatment, 0.68% of general dental practitioners reported that they sometimes use loupes or phone cameras. We believe that the use of magnifying devices should be increased due to the very small area used in root canal treatment and the anatomical differences of the teeth.

In our study, 53.89% of participants reported having attended any seminar/course related to endodontics after graduation. One study showed that the usage rates of loupes significantly increased with the number of hours of endodontic training received. The lowest rate of loupe usage was found among dentists who had not received any training in endodontics. It was observed that the rate of loupe usage increased with the number of endodontic training hours. Among those who reported never using rubber dam, 87.25% belonged to the group that had not received any endodontic training.[28] In a survey conducted by Madarati on dentists' use of rubber dam, it was reported that the usage rate was higher among those who received training (71.4%) compared to those who had not received any training (35.5%), indicating that endodontic training is associated with rubber dam usage.[32] We believe that the reason why there is not much difference between the endodontic treatment procedures of endodontists and general dentists is due to the courses taken.

Pratten stated that the use of EALs for determining working length is more reliable than radiography.[33] Hoer et al.[34] suggested that working length determination should be done using a combination of radiography and EALs. In a study conducted by Ünal et al.[26] in our country, it was shown that 12.8% of dentists use EALs. In a study by Iqbal et al.[35] in Saudi Arabia, 13.5% of dentists reported using this method, while Palmer et al.[36] found that 34.5% of dentists in their study in the UK preferred the combination of radiography and EALs. In our study, 62.28% of participants reported using the combination of radiography and EALs to determine working length. Additionally, there is no statistically significant relationship between titles and the techniques used to determine working length.

In a survey conducted by Meel et al.,[37] the usage rate of NiTi rotary file systems among general dental practitioners was reported to be 75%, while Guelzow et al.[38] found this rate to be 77%. In our study, 88.02% of participants reported using NiTi rotary files in routine root canal treatments. There is no statistically significant relationship between titles and the files used in routine root canal treatments.

Eleazer et al.[39] and Savani et al.[40] reported that 93% of dentists use sodium hypochlorite as an irrigation agent. Another study found that 91.05% of dentists use sodium hypochlorite solution as the primary irrigation agent.[28] In our study, 95.81% of participants use NaOCl/diluted NaOCl as their irrigation solution. However, there is no statistically significant relationship between titles and the irrigation solutions used. We believe that the reason why NaOCl is the most commonly used irrigation solution among endodontists and general dentists is that NaOCl still maintains its validity as the gold standard.

In a study by Savani et al.,[37] it was reported that 81% of dentists do not use any instruments or devices for irrigation activation, and the frequency of usage increases with training in endodontic courses/seminars. Another study found that 87.86% of dentists do not use any instruments for irrigation activation during the procedure.[26] In our study, 74.25% of participants reported not using any activation technique during irrigation. Among those who do use an activation technique, 41.86% reported using PUI. There is no statistically significant relationship between titles and the use of activation techniques during irrigation. In a study conducted by Ekici et al.,[41] it was observed that none of the activation methods used completely removed the debris. We believe that debris that cannot be completely removed even with the activation methods used will create a serious failure rate in root canal treatment without activation.

Studies have shown that endodontic treatments are mostly completed in multiple sessions.[28,30,31] Another study indicated that endodontists predominantly finish the treatment in a single session.[27] In our study, 52.69% of participants reported completing root canal treatment in a single session, while 47.31% completed it in multiple sessions. Among those who completed the treatment in multiple sessions, 97.44% used CaOH as an intracanal medicament. There is a statistically significant relationship between titles and the number of sessions required to complete root canal treatment.

In a study by Gupta et al.,[35] 61% of practitioners preferred the cold lateral compaction technique, while Iqbal et al.[42] reported that 63.5% of practitioners favored the same method. In our study, 52.1% of participants stated that they use the lateral compaction filling technique. However, there was no statistically significant relationship between titles and the filling techniques used.

In a study by Kaptan et al.,[43] epoxy resin-based sealers were reported as the most preferred sealer, and composite restoration was identified as the most commonly used final restoration material after root canal treatment. In our study, 43.11% of participants reported using epoxy resin-based sealers, while 82.63% preferred composite filling restorations after endodontic treatment. However, there was no statistically significant relationship between titles and the type of sealer used, nor between titles and the preferred restorations after endodontic treatment.

CONCLUSION

As a result of this study, it was seen that general dentists have sufficient knowledge about current root canal protocols and materials. It was also seen that endodontists have relatively more knowledge on this subject than general dentists. It is a very positive result that dentists are trying to improve their perspectives on root canal treatment with training and course requests.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Dicle University Faculty of Dentistry Ethics Committee (Date: 29.01.2020, Decision No: 2020-2).

Informed Consent

All participants signed a free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

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Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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