Original Article / Özgün Araştırma

Meandros Med Dent J
doi:10.4274/meandros.galenos.2021.13471
Meandros Med Dent J 2023;24(1):26-33
26

Comparison of Endodontic Treatment Approaches Between Endodontists and General Dentists in Turkey

Türkiye'deki Endodontistler ve Genel Diş Hekimleri Arasındaki Endodontik Tedavi Yaklaşımlarının Karşılaştırılması

Safa Kurnaz, Gülsen Kiraz

Kütahya Health Sciences University, Faculty of Dentistry, Department of Endodontics, Kütahya, Turkey

Abstract

Objective: The purpose of this cross-sectional study was to compare the knowledge and treatment approaches related to endodontic treatment (ET), and the use of new techniques and materials during treatments between general dentists (GD) and endodontists.

Materials and Methods: This study was conducted with endodontists and GDs working in Turkey. The questionnaire consisted of 30 multiple-choice questions divided into three main categories, including demographic information, general approach to ET, and root canal treatment (RCT) procedures. The obtained data were analyzed using the chi-square test ($p<0.05$).

Results: A total of 454 completed questionnaires were collected from a total of 750 distributed questionnaires, resulting in a response rate of 60.5%. Most of the respondents (56.8%) reported performing more than 20 RCTs per week. Approximately 60% of the respondents stated that they never used rubber-dam isolation during ET. It was determined that 89.1% of GDs did not use any magnification system during ET ($p<0.001$). The great majority of the respondents (95.4%) reported using sodium hypochlorite as a primary irrigant. Endodontists used rotary systems more than GDs ($p<0.05$).

Conclusion: Endodontists and GDs take different approaches to ET, and endodontists use new techniques and materials more often than GDs. The results of this study point to the importance and necessity of continuous education programs to encourage the use of new systems and techniques in endodontics.

Keywords: Endodontists, dentists, root canal therapy, questionnaires

Öz

Amaç: Bu kesitsel çalışmanın amacı; genel diş hekimleri ve endodontistler arasında endodontik tedavi ile ilgili bilgi, tedavi yaklaşımları ve tedaviler sırasında yeni teknik ve materyallerin kullanımını karşılaştırmaktır.

Gereç ve Yöntemler: Bu çalışma Türkiye'de çalışan endodontist ve genel diş hekimleri ile gerçekleştirildi. Anket, demografik bilgiler, endodontik tedaviye genel yaklaşım ve kök kanal tedavisi prosedürlerini içeren üç ana kategoriye ayrılan çoktan seçmeli 30 sorudan oluşuyordu. Elde edilen veriler ki-kare testi kullanılarak analiz edildi ($p<0.05$).

Bulgular: Dağıtılan toplam 750 anketten toplam 454 tamamlanmış anket toplandı ve %60,5'lik bir yanıt oranıyla sonuçlandı. Katılımcıların çoğunluğu (%56,8) haftada 20'den fazla kök kanal tedavisi gerçekleştirdiğini bildirdi. Katılımcıların yaklaşık %60'ı endodontik tedavi sırasında rubber-damı hiç kullanmadığını belirtti. Genel diş hekimlerinin %89,1'inin endodontik tedavi sırasında herhangi bir büyütme sistemi kullanmadığı tespit edildi ($p<0,001$). Katılımcıların büyük çoğunluğu (%95,4) ana irrigasyon solüsyonu olarak sodyum hipoklorit kullandığını bildirdi. Endodontistler döner alet sistemlerini genel diş hekimlerine göre daha fazla kullanmaktaydı ($p<0,05$).

Sonuç: Endodontistlerin ve genel diş hekimlerinin endodontik tedaviye yaklaşımları farklılık göstermektedir ve endodontistler yeni teknik ve materyalleri genel diş hekimlerinden daha sık kullanmaktadır. Bu çalışmanın sonuçları, endodontide yeni sistem ve tekniklerin kullanımını teşvik etmek için sürekli eğitim programlarının önemine ve gerekliliğine işaret etmektedir.

Anahtar Kelimeler: Endodontistler, diş hekimleri, kök kanal tedavisi, anketler

Address for Correspondence/Yazışma Adresi: Safa Kurnaz Asst. Prof., Kütahya Health Sciences University, Faculty of Dentistry, Department of Endodontics, Kütahya, Turkey
Phone: +90 274 230 00 56 **E-mail:** safa.kurnaz@ksbu.edu.tr
ORCID ID: orcid.org/0000-0002-8079-7536

Received/Geliş Tarihi: 17.04.2021
Accepted/Kabul Tarihi: 22.11.2021

This study was presented as an oral presentation at the Necmettin Erbakan University International Dentistry Congress on October 2-3, 2021.

Introduction

Root canal treatment (RCT) is an indispensable part of modern dentistry, and dentistry faculties should prepare their students to perform uncomplicated RCTs of acceptable quality. During their education, dentistry students can access up-to-date information through their academic programs. However, after graduation, dentists must follow developments in the field of endodontics out of their own interests and efforts. Applications related to endodontics are widely used in postgraduate training. General dentists (GD) who attend such seminars often want to learn how to perform RCT easier and more successful (1).

Dentists' knowledge of and experience with RCTs affect the success of endodontic treatment (ET) (2). In 2006, the European Society of Endodontology published guidelines for ET which outline the standard of care for endodontics according to scientific evidence (3). It has been reported that the majority of dentists worldwide do not follow these guidelines (4).

Many studies have examined the success rates of ET to date, reporting success rates in the range of 74-98% for RCT (5-7). However, the success rates of ETs for GDs have been lower, measured at 65-75% (8). In Turkey, the majority of RCTs are performed by GDs, making it is very important for GDs to follow developments in endodontics (9). Several studies have assessed the knowledge and practice of dentists in specific countries (10,11). However, few studies have examined dentists' attitudes toward new endodontic materials and techniques in Turkey (12,13).

The aim of this study was to assess and compare GDs and endodontists in Turkey in terms of their attitudes toward and knowledge and use of procedures, materials and recently developed techniques in ET. The scope of the study was also to evaluate whether endodontic specialty, years of professional experience or gender affected the choice of treatment procedures or the use of new technologies and materials.

Materials and Methods

This study was approved by the Clinical Research Ethics Committee of Kütahya Health Sciences University, Kütahya, Turkey (decision no: 2020/03-07, date: 06.02.2020). A questionnaire was designed on the basis of similar studies involving surveys of GD and endodontists (12,14-16). A survey was designed using Google Forms, and a link was mailed electronically to 750 GDs and endodontists. A reminder e-mail was sent two weeks later after the initial correspondence. Three hundred forty GDs and 114 endodontists returned the questionnaires. The questionnaire consisted of 30 multiple-choice questions. All the respondents received a written explanation about the study before participation and they were informed that their participation in the study was entirely voluntary. Informed consents were obtained before the onset of the survey.

The questions were divided into three main categories as follows:

1- General information: gender, age, specialty, years of professional experience and type of practice (i.e., private dental clinics or government hospitals)

2- General approach to ET: working hours per week; frequency of RCT, retreatment and trauma cases; types of the tooth treated; use of rubber-dam, magnification systems, cone-beam computed tomography (CBCT), ultrasonics and irrigation activation systems; number of treatment visits for vital and devital teeth; frequency of complications; perspective on regeneration and apical surgery

3- RCTs procedures: method of working length (WL) determination; preference of root canal files, root canal irrigants and intracanal medicaments; use of lubricants; choice of smear layer removal; most challenging step during ET and types of complications; and treatment choices for drainage and crown restorations

Statistical Analysis

The data were collected and analyzed using the statistical package SPSS 20 (Statistical Package for Social Sciences, Chicago, IL, USA). The obtained data were analyzed using the chi-square test, and the level of significance was set at 0.05.

Results

A total of 454 completed questionnaires were collected from a total of 750 distributed questionnaires, resulting in a response rate of 60.5%. The demographic information and characteristics of participants are presented in Table 1.

General approach to ET

The results of the general approach to ET are presented in Table 2. There was a statistically significant difference in working hours between GDs and endodontists ($p<0.05$). While the endodontists mostly worked 30-40 hours, the GDs usually worked over 40 hours a week.

The majority of the respondents reported performing more than 20 RCTs and 1-5 retreatment cases per week. While the endodontists performed a high rate of more than 20 RCTs, the GDs mostly performed 1-5 retreatment cases per week ($p<0.001$).

The vast majority of the participants reported that they mostly treated molar teeth (83.0%). Out of the endodontists, 97.4% reported that they treated molar teeth, while 78.2% of the GDs treated molar teeth.

It was determined that the majority of the respondents (59.7%) never used rubber-dam isolation during ET. Only 4.9% of the respondents reported that they routinely use rubber-dam during ET. The vast majority of the endodontists (82.5%) reported using rubber-dam in some cases. Most of the GDs (77.9%) reported that they never used rubber-dam.

While 28.1% of the endodontists used a dental operating microscope in some cases, 24.6% used dental loupes in some cases. Out of the GDs, 89.1% stated that they did not use any magnification system during ET ($p<0.001$). Likewise, 65.9% of the participants did not use CBCT for RCT or retreatment indications, while 84.2% of the endodontists stated that they used CBCT in some cases ($p<0.001$). Additionally, 57.1% of the participants never used ultrasonic systems during treatment, whereas 79.0% of the endodontists used ultrasonic systems in some cases ($p<0.001$). More endodontists than GDs used irrigation activation devices during irrigation, and this difference was statistically significant (59.7% and 31.2%, respectively) ($p<0.05$).

The majority of the participants (72.2%) stated that the frequency of complications, or the rate of procedural errors experienced during treatment, was 0-10%; however, whether patients were treated by endodontics specialists did not significantly influence the frequency of procedural errors ($p>0.05$).

It was determined that 68.4% of the endodontists performed regenerative ET, and 66.5% of the GDs had not yet performed this treatment but wanted to do it in the future. Moreover, only 16.5% of the participants reported that they performed apical surgery, while 51.1% reported that they referred patients to a maxillofacial surgeon for apical surgery.

Table 1. Characteristics of study respondents (n=454)

	n (%)
Gender	
Male	215 (47.4)
Female	239 (52.6)
Age	
25-35	329 (72.4)
35-45	72 (15.9)
45-55	47 (10.4)
>55	6 (1.3)
Years in practice	
<5	146 (32.2)
5-10	175 (38.5)
11-20	80 (17.6)
>20	53 (11.7)
Clinical speciality	
General dentist	340 (74.9)
Endodontist	114 (25.1)
Type of practice	
Private dental office	205 (45.1)
Government hospital	249 (54.9)

RCT Procedures

The results of the RCT procedures are presented in Table 3. The plurality of the respondents (48.0%) preferred a combination of both radiographs and electronic apex locators as the WL determination method. Continuous rotary systems were also among the most popular instruments (57.7%). The preference in type of root canal file was affected by clinical specialty. More endodontists than GDs generally used continuous rotary systems, and this difference was statistically significant (82.5% and 49.4%, respectively) ($p<0.05$).

The great majority of the practitioners (95.4%) used sodium hypochlorite as a primary irrigant. Most of the practitioners preferred root canal lubricants during ET. Likewise, 83.5% of the respondents preferred root canal medicaments for multi-visit treatments. Specialty did not affect the use of root canal medicaments during ET ($p>0.05$).

Most of the practitioners (65.0%) stated that they did not leave the teeth open for drainage. While 41.2% of the GDs stated that in some cases the teeth were left open for drainage, 95.6% of the endodontists stated that they did not leave teeth open for drainage ($p<0.001$)

The participants stated that the most challenging step during ET was chemo-mechanical preparation (30.0%). While a high rate of the endodontists likewise reported that the most challenging stage is chemo-mechanical preparation (47.4%), the GDs stated that they had more difficulty during isolation (27.1%). The majority of the participants (72.2%) stated that the complication they experienced most frequently during treatment was instrument separation (67.8%). Whether the practitioners were endodontic specialists or not did not significantly influence the type of procedural errors encountered during ET ($p>0.05$).

The participants stated that a high proportion of teeth required crown restorations when there was no wall left or only one wall remaining of a tooth (53.7%). Specialty did not influence the choice to treat with crown restorations.

Discussion

This survey aimed to evaluate the attitudes, knowledge and practice patterns of GDs and endodontists in Turkey. In the reviewed literature, there was no detailed information on the operating principles of GDs and endodontists in Turkey. The data collected in our study can thus serve as a basic source of information for future research on GDs and endodontists in the field of endodontics.

A large proportion of the respondents reported performing more than 20 RCTs and 1-5 retreatments per week. In 2012, Kaptan et al. (13) found that clinicians in Turkey performed only 10 RCTs per month. The rising ratio of RCTs performed in Turkey since 2012 is promising. Unfortunately, it was observed that some of the respondents, especially the GDs working in government hospitals, performed a small number of retreatments.

Table 2. Results of questions related to respondents' general approach to ET			
	General dentist	Endodontist	p-value
Weekly working hours			
0-20	11 (3.2%)	0 (0%)	
20-30	24 (7.1%)	9 (7.9%)	*
30-40	124 (36.5%)	65 (57.0%)	
>40	181 (53.2%)	40 (35.1%)	
Average number of RCTs per month			
0	12 (3.5%)	0 (0%)	
1-5	25 (7.4%)	0 (0%)	
6-10	61 (17.9%)	2 (1.8%)	**
11-15	48 (14.1%)	2 (1.8%)	
16-20	39 (11.5%)	7 (6.1%)	
>20	155 (45.6%)	103 (90.3%)	
Average number of endodontic retreatments per month			
0	103 (30.3%)	2 (1.8%)	
1-5	196 (57.7%)	12 (10.5%)	
6-10	16 (4.7%)	16 (14.0%)	**
11-15	9 (2.6%)	27 (23.7%)	
16-20	6 (1.8%)	15 (13.2%)	
>20	10 (2.9%)	42 (36.8%)	
Trauma cases per month			
0-5	329 (96.8%)	112 (98.2%)	
5-10	9 (2.6%)	2 (1.8%)	NS
>10	2 (0.6%)	0 (0%)	
Types of cases treated routinely			
Anterior	36 (10.6%)	0 (0%)	
Premolar	38 (11.2%)	3 (2.6%)	*
Molar	266 (78.2%)	111 (97.4%)	
Rubber dam isolation			
Always	8 (2.4%)	14 (12.3%)	
In some cases	67 (19.7%)	94 (82.5%)	**
Never	265 (77.9%)	6 (5.2%)	
Use of magnifications systems			
Always dental loupe	11 (3.2%)	10 (8.7%)	
Always dental operating microscope	2 (0.6%)	1 (0.9%)	
Dental loupe in some cases	22(6.5%)	28 (24.6%)	**
Dental operating microscope in some cases	2 (0.6%)	32 (28.1%)	
Never	303 (89.1%)	43 (37.7%)	

Table 2. Continued

	General dentist	Endodontist	p-value
Use of irrigation activation devices			
Yes	106 (31.2%)	68 (59.7%)	**
No	234 (68.8%)	46 (40.3%)	
Use of ultrasonic systems			
Always	12 (3.5%)	8 (7.0%)	**
In some cases	85 (25.0%)	90 (79.0%)	
Never	243 (71.5%)	16 (14.0%)	
Use of CBCT			
Always	8 (2.4%)	1 (0.9%)	**
In some cases	50 (14.7%)	96 (84.2%)	
Never	282 (82.9%)	17 (14.9%)	
Visit of RCT for vital cases			
Single-visit	170 (50%)	76 (66.7%)	*
Multi-visit	28 (8.2%)	0 (0%)	
Usually single-visit	99 (29.1%)	38 (33.3%)	
Usually multi-visit	43 (12.7%)	0 (0%)	
Visit of RCT for devital cases			
Single-visit	49 (14.4%)	9 (7.9%)	**
Multi-visit	114 (33.5%)	8 (7.0%)	
Usually single-visit	73 (21.5%)	57 (50.0%)	
Usually multi-visit	104 (30.6%)	40 (35.1%)	
Experience of complication or procedural errors (%)			
0-10	246 (72.4%)	82 (71.9%)	NS
10-30	83 (24.4%)	32 (28%)	
30-50	9 (2.6%)	0 (0%)	
>50	2 (0.6%)	0(0%)	
Regenerative treatment practice			
Performed	72 (21.2%)	78 (68.4%)	**
Not performed, but would like to	226 (66.5%)	32 (28.1%)	
Would not perform	42 (12.3%)	4 (3.5%)	
Apical surgery practice			
Performed	56 (16.5%)	19 (16.7%)	*
Would not perform	130 (38.2%)	17 (14.9%)	
Refer to an oral surgeon	154 (45.3%)	78 (68.4%)	

Pearson chi-square test, NS: Not-significant ($p>0.05$), *$p<0.05$, **$p<0.001$, RCT: Root canal treatment, CBCT: Cone-beam computed tomography

Table 3. Results of questions related to respondents' use of RCTs procedures			
	General dentist	Endodontist	p-value
Working length determination			
Tactile sensation	17 (5.0%)	0 (0%)	
Paper point technique	5 (1.5%)	0 (0%)	
Radiography	67 (19.7%)	2 (1.8%)	*
Electronic apex locator	97 (28.5%)	48 (42.1%)	
Electronic apex locator + radiography	154 (45.3%)	64 (56.1%)	
Root canal instruments routinely used			
Hand files	42 (12.4%)	2 (1.8%)	
Ni-Ti rotary systems	168 (49.4%)	94 (82.4%)	**
Ni-Ti reciprocating systems	130 (38.2%)	18 (15.8%)	
Use of a lubricant during canal instrumentation			
Yes	238 (70%)	93 (81.6%)	NS
No	102 (30%)	21 (18.4%)	
Choice of primary root canal irrigation solution			
Sodium hyphoclorite	319 (93.8%)	114 (100%)	
Saline solution	10 (2.9%)	0 (0%)	
Chlorhexidine	5 (1.5%)	0 (0%)	NS
Hydrogen peroxide	3 (0.9%)	0 (0%)	
Other	3 (0.9%)	0 (0%)	
Removal of smear layer			
Yes	233 (68.5%)	97 (85.1%)	NS
No	107 (31.5%)	17 (14.9%)	
Use of intracanal medicament between appointments for multiple-visit cases			
Yes	277 (81.5%)	102 (89.5%)	NS
No	63 (18.5%)	12 (10.5%)	
Leave teeth open for drainage			
Yes	14 (4.1%)	0 (0%)	
In some cases	140 (41.2%)	5 (4.4%)	**
No	186 (54.7%)	109 (95.6%)	
Most challenging step for ET			
Anesthesia	26 (7.6%)	15 (13.2%)	
Access cavity preparation and root canal location	82 (24.1%)	17 (14.9%)	
Isolation	92 (27.1%)	20 (17.5%)	*
Chemomechanical preparation	83 (24.4%)	54 (47.4%)	
Obturation	57 (16.8%)	8 (7.0%)	

Table 3. Continued

	General dentist	Endodontist	p-value
Most precedural error			
Instrument seperation	222 (65.3%)	86 (75.4%)	NS
Perforation	2 (0.6%)	2 (1.8%)	
Blockage	86 (25.3%)	19 (16.7%)	
Unable to locate canals	13 (3.8%)	0 (0%)	
Other	17 (5.0%)	7 (6.1%)	
Crown restoration preference			
If the tooth has no walls or only one wall	176 (51.8%)	69 (60.5%)	NS
If the tooth has two walls	109 (32.1%)	40 (35.1%)	
If the tooth has three walls	15 (4.4%)	0 (0%)	
Always	40 (11.7%)	5 (4.4%)	

Pearson chi-square test, NS: Not-significant (p>0.05), *p<0.05, **p<0.001, ET: Endodontic treatment

According to the guidelines of the European Society of Endodontology, RCT procedures should only be performed if the tooth is isolated by a rubber-dam. However, rubber-dams were used routinely by only 4.8% of the respondents in our study, and the vast majority of the practitioners (59.9%) reported never using rubber-dams during ET procedures. In order to spread awareness of the benefit of rubber-dams, sufficient training on this subject should be provided in undergraduate education; practitioners should be supported thereafter with training and should be informed about malpractice.

The use of magnification systems is important, especially for locating extra canals and evaluating the anatomy of the pulp chamber. In our study, 76.7% of the participants reported that they did not use magnification systems; 28.1% of the endodontists used dental operating microscopes, and 24.6% used dental loupes in some cases. Among the GDs, 89.1% did not use any magnification system (p<0.001). Based on these results, the use of magnification should be encouraged in Turkey to ensure successful ET. Similarly, 66.1% of the participants did not use CBCT for ETs, while 84.2% of the endodontists used CBCT in some cases (p<0.001). It appears that the importance of using CBCT is taught well in endodontics education in Turkey, and we hope that its use will become more common with the help of training and seminars (17).

Regenerative ETs have developed in the past decade and have become an effective treatment alternative for immature teeth (18). In our research, although 68.4% of the endodontists had performed regenerative procedures, 66.5% of the GD had not performed such procedures but wanted to do so if given the opportunity. As regenerative treatments are taught and practiced as part of the endodontics specialty degree in Turkey, there is no practical application of this subject in undergraduate education. GDs' avoidance of regenerative treatment can be attributed to this lack of education.

In our study, both the endodontists and the GDs reported that the most common complication was instrument separation (67.8%). The procedural error of instrument separation, common in Turkey, may be attributed to overuse of instruments for economic reasons. In addition, the GDs stated that isolation was the most challenging step during RCT. GDs may have difficulty with isolation since they do not usually use rubber-dams during RCT.

Conclusion

According to the findings of this cross-sectional study, it was showed that the general approaches to ET procedures in Turkey differ from the widely acknowledged quality guidelines in endodontics. Despite the introduction of new materials and techniques, most of the GDs surveyed chose conventional methods. GDs and endodontists have different approaches to ET, and the endodontists in this study used new techniques and materials more often than the GDs. The findings indicate the importance and necessity of postgraduate training and courses to improve standard ET quality in Turkey.

Ethics

Ethics Committee Approval: This study was approved by the Clinical Research Ethics Committee of Kütahya Health Sciences University, Kütahya, Turkey (decision no: 2020/03-07, date: 06.02.2020).

Informed Consent: Informed consents were obtained before the onset of the survey.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: S.K., G.K., Concept: S.K., G.K., Design: S.K., G.K., Data Collection or Processing: S.K., G.K., Analysis or Interpretation: S.K., Literature Search: S.K., G.K., Writing: S.K., G.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Field JC, Cowpe JG, Walmsley AD. The Graduating European Dentist: A New Undergraduate Curriculum Framework. Eur J Dent Educ 2017; 21 Suppl 1: 2-10.
2. Gupta R, Rai R. The adoption of new endodontic technology by Indian dental practitioners: a questionnaire survey. J Clin Diagn Res 2013; 7: 2610-4.
3. European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology. Int Endod J 2006; 39: 921-30.
4. 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.
5. Friedman S, Mor C. The success of endodontic therapy--healing and functionality. J Calif Dent Assoc 2004; 32: 493-503.
6. Lazarski MP, Walker WA 3rd, Flores CM, Schindler WG, Hargreaves KM. Epidemiological evaluation of the outcomes of nonsurgical root canal treatment in a large cohort of insured dental patients. J Endod 2001; 27: 791-6.
7. Doyle SL, Hodges JS, Pesun IJ, Law AS, Bowles WR. Retrospective cross sectional comparison of initial nonsurgical endodontic treatment and single-tooth implants. J Endod 2006; 32: 822-7.
8. Eriksen HM. Endodontology--epidemiologic considerations. Endod Dent Traumatol 1991; 7: 189-95.
9. Peciuliene V, Maneliene R, Drukteinis S, Rimkuviene J. Attitudes of general dental practitioners towards endodontic standards and adoption of new technology: literature review. Stomatologija 2009; 11: 11-4.
10. 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; 22: 113-7.
11. Whitten BH, Gardiner DL, Jeansonne BG, Lemon RR. Current trends in endodontic treatment: report of a national survey. J Am Dent Assoc 1996; 127: 1333-41.
12. Unal GC, Kaya BU, Tac AG, Kececi AD. Survey of attitudes, materials and methods preferred in root canal therapy by general dental practice in Turkey: Part 1. Eur J Dent 2012; 6: 376-84.
13. Kaptan RF, Haznedaroglu F, Kayahan MB, Basturk FB. An investigation of current endodontic practice in Turkey. ScientificWorldJournal 2012; 2012: 565413.
14. Savani GM, Sabbah W, Sedgley CM, Whitten B. Current trends in endodontic treatment by general dental practitioners: report of a United States national survey. J Endod 2014; 40: 618-24.
15. Al-Nahlawi T, Doumani M, Alalo HA, Habib A. Dentists' Knowledge, Attitude and Practice of Root Canal Treatment Procedure: Survey-based Research. J Contemp Dent Pract 2019; 20: 347-54.
16. Lin S, Sabbah W, Sedgley CM, Whitten B. A survey for endodontists in today's economy: exploring the current state of endodontics as a profession and the relationship between endodontists and their referral base. J Endod 2015; 41: 325-32.
17. Dutner J, Mines P, Anderson A. Irrigation trends among American Association of Endodontists members: a web-based survey. J Endod 2012; 38: 37-40.
18. Diogenes A, Ruparel NB, Shiloah Y, Hargreaves KM. Regenerative endodontics: A way forward. J Am Dent Assoc 2016; 147: 372-80.