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Comparison of Treatment Approaches of Endodontists and General Dentists to Patients Presenting Pain During or After Root Canal Treatment

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ABSTRACT

Aim: The aim of this study is to investigate, through a survey, the differences between physicians' approaches to patients who apply to dentistry clinics with pain due to endodontic reasons.

Material and Methods: The survey prepared for dentists working as general dentists and in the field of endodontics throughout Türkiye was organized via Google Forms and sent to the participants by e-mail. Volunteer dentists who agreed to participate in the study were included in the sample. A total of 203 dentists, including 56 endodontists and 147 general dentists, participated in survey. The survey was designed in two parts. The first part consisted of personal information such as age, gender and education level. The second part aimed to identify different approach protocols during endodontic treatment practices of dentists. Endodontists' and dentists' methods of following current issues, single-session or multi-session preferences, and treatment approaches to patients presenting with pain were evaluated.

Results: Statistically significant differences were found between endodontists' and dentists' methods of following current issues; single-session or multi-session preferences, and treatment approaches to patients presenting with pain ($p<0.05$).

Conclusion: During treatment of pulpal and periapical infections, behavior and attitude of treating dentist are closely related to the level of expertise. In addition, different clinical scenarios also affect these behaviors. Additionally, the results of the current study showed that both endodontists and general dentists prescribe antibiotics at high rates.

Keywords: Antibiotics; pain; root canal treatment.

Kanal Tedavisi Sırasında ve Sonrasında Ağrısı Olan Hastalarda Endodontist ve Genel Diş Hekimlerinin Tedavi Yaklaşımlarının Karşılaştırılması

ÖZ

Amaç: Bu çalışmanın amacı endodontik nedenlerden dolayı ağrı şikayetiyle diş hekimliği kliniklerine başvuran hastalara hekimlerin yaklaşımları arasındaki farklılıkları anket yoluyla araştırmaktır.

Gereç ve Yöntemler: Türkiye genelinde genel diş hekimliği yapan ve endodonti alanında çalışan diş hekimlerine yönelik hazırlanan anket, Google Formlar aracılığıyla düzenlenerek katılımcılara e-posta yoluyla gönderildi. Araştırmaya katılmayı kabul eden gönüllü diş hekimleri örneklem kapsamına alındı. Ankete 56'sı endodonti uzmanı, 147'si genel diş hekimi olmak üzere toplam 203 diş hekimi katıldı. Anket iki bölüm halinde tasarlandı. Birinci bölümde yaş, cinsiyet, eğitim düzeyi gibi kişisel bilgiler yer almaktadır. İkinci bölümde ise diş hekimlerinin endodontik tedavi uygulamalarına yaklaşım protokolleri arasındaki farklılıkların belirlenmesi amaçlandı. Endodontist ve genel diş hekimlerinin güncel konuları takip etme yöntemleri, tek seans veya çoklu seans tercihleri ve ağrı şikayetiyle başvuran hastalara yönelik tedavi yaklaşımları değerlendirildi.

Bulgular: Endodontist ve genel diş hekimlerinin güncel konuları takip etme yöntemleri, tek seans veya çoklu seans tercihleri ve ağrı şikayetiyle başvuran hastalara yönelik tedavi yaklaşımları arasında istatistiksel olarak anlamlı farklılıklar bulundu ($p<0,05$).

Sonuç: Pulpal ve periapikal enfeksiyonların tedavisi sırasında tedaviyi yapan diş hekiminin davranış ve tutumu uzmanlık düzeyi ile yakından ilişkilidir. Ayrıca farklı klinik senaryolar da bu davranışları etkilemektedir. Ek olarak, mevcut çalışmanın sonuçları hem endodontistlerin hem de genel diş hekimlerinin yüksek oranda antibiyotik reçete ettiğini göstermiştir.

Anahtar Kelimeler: Ağrı; antibiyotikler; kök kanal tedavisi.

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INTRODUCTION

Even when endodontic treatment is performed to acceptable standards, the emergence of mild to moderate postoperative pain is not an uncommon occurrence. Some factors, such as preoperative pain and retreatment, can contribute to the development of postoperative pain (1). Significant variations can exist in decision-making within and among dentists during the endodontic treatment process (2). The complexity of treatment procedures and various treatment alternatives introduces diversity in the selection of appropriate treatment (3). It has been demonstrated that decision-making depends on encountered technical issues, clinicians' clinical experience, confidence, and education (4). A study found a significant difference between the approaches of endodontists and general dentists regarding the treatment of post-endodontic pain and swelling. While endodontists prefer a standard protocol, which obviously indicates that complete instrumentation of root canals is the ideal treatment plan as a standard protocol in all endodontic emergency conditions, involving complete instrumentation or re-instrumentation of the canal (5), general dentists have a lower preference for this standard protocol (6). The prescription of antibiotics should follow the preferred protocol, but it has been noted that there is insufficient knowledge about antibiotic prescription protocols among all dentists (7). This lack of knowledge is reported to be lower among endodontists than general dentists (6). In cases of severe pain between sessions, most endodontists recommend re-instrumentation of the canal and prescribing analgesics, while general dentists have a lower preference for these actions (6).

Significant differences have also been noted between endodontists and general dentists regarding the selection of intracanal medicaments. Endodontists mostly use them in cases of pulp necrosis and fluctuant swellings, whereas general dentists use them in cases of severe pain and swelling between sessions (6). Pain that may occur during or after endodontic procedures is undesirable for both patients and clinicians. It is anticipated that there may be differences in clinicans' approaches to a patient having pain.

Therefore, this study aimed to determine how general dentists and endodontists approach patients presenting with endodontic pain and to identify under what circumstances general dentists feel the need to refer to an endodontist. Additionally, it was whether the general dentists and endodontists approach the patients with endodontic pain differently. A survey was designed for these purposes. The hypothesis of the study is that there is no difference in approaches regarding post- and intra-treatment pain between endodontists and general dentists.

MATERIAL AND METHODS

The research protocol was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Tokat Gaziosmanpaşa University Clinical Research Ethics Committee on February 18, 2021, with protocol number 83116987-214. This survey study was designed to evaluate the differences in the approaches of general dentists or endodontists in Türkiye who work in the field of endodontics and treat patients with endodontic pain. The data collection tool used in this study was a questionnaire prepared by the researchers (Table 1). The survey, conducted throughout Türkiye, was organized using Google Forms and sent to participants via email, targeting dentists working in the field of endodontics or as general dentists. Volunteer dentists who agreed to participate were included in the sample. The sample size was calculated based on previous similar studies and the number of dentists who participated in these studies (6-10). The questionnaire was designed in two parts. The first part consisted of personal information such as age, gender, and education level. The second part aimed to identify the approaches of endodontists and general dentists to patients with pain during endodontic treatment.

Statistical Analysis

In calculating the sample size for the study, Power (Test Power) was set at a minimum of 80%, and Type-1 error was set at 5%. Descriptive statistics, expressed as number (n) and percentage (%), were used for each variable. "Chi-square test" and "Fisher's exact test" were employed to determine the relationship between categorical variables. When significant differences were found, post-hoc pairwise comparisons were conducted using Bonferroni-adjusted z-tests to determine which specific groups differed significantly from each other, with adjusted p-values reported. Multiple Correspondence Analysis was conducted to examine the relationship between categorical variables. Years of professional experience were categorized into three groups (0-5 years, 6-10 years, and >10 years) to examine differences in treatment approaches based on distinct career stages, following similar categorizations used in previous studies (6-10). A significance level of $p < 0.05$ was adopted for calculations, and the SPSS (IBM SPSS for Windows, ver.26) statistical software package was used for analysis.

RESULTS

A total of 203 dentists participated in this survey study, including 56 endodontists, 147 general dentists. To perform the statistical analysis of the obtained data, two groups were formed: the first group consisted of endodontists, and the second group included general dentists. The attitude approaches of these two groups to patients with pain during endodontic treatment were statistically compared.

Table 2 provides the general distribution (descriptive statistics) of the demographic characteristics of the participants. It is observed that the majority of the participating dentists (123 (60.59%) were female. Similarly, most dentists (139 (68.47%)) had 0-5 years of experience, and the majority (109 (53.69%)) worked in private clinics.

Table 3 presents the relationship and distribution between the "Area of expertise" and "Personal information" of the dentists. When examined, it is seen that all endodontists (56 (100.00%)) answered "yes" to the question "Do you follow current developments in the field of Endodontics?". In contrast, 115 (78.23%) of general dentists answered "yes," and a statistically significant relationship was observed between these responses and the "Area of expertise" ($p<0.05$).

Table 1. Survey questions

1. What is your gender? a) Male b) Female	**2.** How many years of work experience do you have? a) 0-5 years b) 5-10 years c)>10 years
3. Where do you work? a) Private b) Public institution c) University hospital	**4.** What is your specialization? a) I am an endodontist b) I am a general dentist c) I am a specialist in another field
5. Do you follow the recent developments in the field of endodontics? a) Yes b) No	**6.** If yes, what methods do you prefer for this? a) I follow current articles. b) I listen to recommendations from companies. c) I follow through social media. d) I attend seminars.
7. How many patients, on average, do you perform root canal treatment on per day? a) 0 b) 1-3 c) 3-5 d) >5	**8.** What is the success rate of your treatments? a) 0-10% b) 10-25% c) 25-50% d) 50-75% e) 75-100%
9. When performing routine treatments, do you prefer single-session or multiple-session treatment? **a) Single session b) Multiple sessions c) No preference**	**10.** What are your reasons for choosing multiple-session treatments? a) To apply medicament b) Because sessions are prolonged c) Due to financial reasons d) To catch details missed in the first session e) To resolve complications arising in the first session
11. A patient with irreversible pulpitis receives single-session treatment. The patient returns with pain and/or swelling three days after treatment. What is your approach? a) Prescribe pain relievers and antibiotics. b) Remove the existing canal, call the patient back in 2-3 days. c) Remove the existing canal, extend the preparation, call the patient back in 2-3 days. d) Remove the existing canal, extend the preparation, apply medicament to the canal. e) Extract the tooth.	**12.** You are performing multiple-session treatment for a patient with irreversible pulpitis. The patient returns with pain and/or swelling three days after the first session. What is your approach? a) Prescribe pain relievers and antibiotics. b) Open the canal, perform irrigation, and close it. c) If medicament was used, clean it from the canals, schedule a new appointment in 2-3 days. d) If medicament was used, clean it from the canals, extend the preparation, and apply medicament again. e) Extract the tooth.
13. A patient with acute/chronic apical periodontitis receives single-session treatment. The patient returns with pain and/or swelling three days after treatment. What is your approach? a) Prescribe pain relievers and antibiotics. b) Remove the existing canal, call the patient back in 2-3 days. c) Remove the existing canal, extend the preparation, call the patient back in 2-3 days. d) Remove the existing canal, extend the preparation, apply medicament to the canal. **e) Extract the tooth.**	**14.** You are performing multiple-session treatment for a patient with acute/chronic apical periodontitis. The patient returns with pain and/or swelling three days after the first session. What is your approach? a) Prescribe pain relievers and antibiotics. b) If medicament was used, clean it from the canals, schedule a new appointment in 2 days. c) If medicament was used, clean it from the canals, extend the preparation. d) If medicament was used, clean it from the canals, extend the preparation, and apply medicament again. e) Refer to an endodontist. f) Extract the tooth.
15. Patients returning with pain, which group do you think they belong to the most? a) Treatments finished in a single session b) Between sessions in previously untreated teeth with multiple sessions c) After completion of treatment in previously untreated teeth with multiple sessions d) Between sessions in retreated teeth e) After completion of treatment in retreated teeth	**16.** When a patient returns with pain, what is the first thing that comes to your mind as the cause of pain related to treatment procedures? a) Debris, irrigation solution, or canal filling material overflowing from the canal b) Presence of residual pulp in the canal c) Inadequate filling d) Inadequacy in the restoration over the canal treatment e) Undiscovered canal
17. When a patient, whose treatment you completed 1 month ago, comes to your clinic with pain in the relevant tooth, what is your approach? a) Remove the existing canal, perform retreatment. b) Prescribe pain relievers and antibiotics to the patient. c) Refer/send for apical resection. d) Refer to an endodontist. e) Extract the tooth.	**18.** When a patient, whose treatment you completed 1 year ago, comes to your clinic with pain in the relevant tooth, what is your approach? a) Remove the existing canal, perform retreatment. b) Prescribe pain relievers and antibiotics to the patient. c) Refer/send for apical resection. d) Refer to an endodontist. e) Extract the tooth.

Table 2. General descriptive statistics of demographic measurements of participating physicians in the study

		Endodontist		General Dentist		Total
		n	%	n	%	%
Gender	Male	22	39.29	58	39.46	39.41
	Female	34	60.71	89	60.54	60.59
	Total	**56**	**100.00**	**147**	**100.00**	**100.00**
Years of Experience	0-5 years	28	50.00	111	75.51	68.47
	6-10 years	16	28.57	22	14.97	18.72
	10+ years	12	21.43	14	9.52	12.81
	Total	**56**	**100.00**	**147**	**100.00**	**100.00**
Workplace	Public Institution	8	14.28	38	25.85	22.66
	Private	10	17.86	99	67.35	53.69
	University Hosp.	38	67.86	10	6.80	23.65
	Total	**56**	**100.00**	**147**	**100.00**	**100.00**

Similarly, a statistically significant relationship was observed between the answers to the question "If you follow current developments in the field of Endodontics, what methods do you prefer?" and the "Area of expertise" (p=0.001). Post-hoc tests revealed that endodontists were significantly more likely to follow current articles (64.29% vs. 6.12%, p<0.001), while general dentists significantly preferred social media (54.42% vs. 21.43%, p<0.001) and attended seminars (25.17% vs. 14.29%, p<0.05) to stay updated. Furthermore, a statistically significant relationship was observed between the answers to the question "How many patients, on average, do you perform root canal treatment on per day?" and the "Area of expertise" (p<0.05). Post-hoc analysis showed that endodontists performed root canal treatment on an average of 4 or more patients per day (82.14% vs. 36.05%, p<0.001), whereas the majority of general dentists mostly treated three or fewer patients (60.55% vs. 17.86%, p<0.001). A statistically significant relationship was observed between the answers to the question "When performing routine endodontic treatment, do you prefer single-visit or multiple-visit treatment?" and the "Area of expertise" (p<0.05). Endodontists tended to prefer single-visit endodontic treatment (28 (50.00%)) significantly more than general dentists (32.65%, p=0.028), while general dentists tended to prefer multiple-visit treatment (59.19% vs. 28.57%, p=0.016). When choosing multiple-visit endodontic treatment, it was observed that in all groups, the most common reason cited by dentists was to apply medicament. However, no statistically significant relationship was observed between the answers to other questions given by the participating dentists and the area of expertise (p>0.05). Table 4 provides the relationship and distribution between the area of expertise and treatment approaches of the dentists. When examined, it was seen that most general dentists preferred prescribing analgesics and antibiotics when a patient with irreversible pulpitis returns to the clinic after three days of single-visit treatment with pain and/or swelling, most general dentists preferred prescribing analgesics and (79 (53.75%)). Post-hoc comparisons revealed significant differences in treatment approaches, as endodontists preferred extracting and enlarging the canal and giving a new appointment (32.14% vs. 10.20%, p=0.006), while general dentists preferred this along with sending medicament into the canal (30.60% vs. 0.00%, p<0.001). Similarly, a statistically significant relationship was observed between the answers to the question "In which group do patients who return to you due to pain belong more often?" and the "Area of expertise" (p<0.05).

Post-hoc analysis showed that endodontists most frequently (22 (39.29%)) mentioned pain between sessions in teeth where retreatment was performed compared to general dentists (30.61%, p=0.044), while general dentists most commonly (51 (34.69%)) mentioned pain between sessions in teeth where multiple sessions of root canal treatments were performed (vs. 25.00% for endodontists, p=0.039) and, to a lesser extent, between sessions in retreated teeth (45 (30.61%)) unlike endodontists. Additionally, a statistically significant relationship was observed between the answers to the question "When your patient comes to you with pain, what is the first thing that comes to your mind as the cause of pain related to treatment procedures?" and the "Area of expertise" (p<0.05). The majority of endodontists (38 (67.86%)) believed that pain could be caused by debris, irrigation solution, or canal filling material overflowing from the canal significantly more than general dentists (30.61%, p<0.001).

Table 3. Relationship and distribution between "area of expertise" and "personal information" of physicians

		Endodontist		General Dentist		*p-value
		n	%	n	%	
Follow current developments in the field of endodontics?	Yes	56	100.00	115	78.23	***0.019***
	No	0	0.00	32	21.77	
	Total	**56**	**100.00**	**147**	**100.00**	
If yes, what methods do you prefer for this?	Read current articles	36	64.29[1]	9	6.12[1]	***0.001 ([1,2] <0.001, [3] =0.042 according to Bonferroni correction)***
	Attend seminars	8	14.28[2]	37	25.17[2]	
	Follow on social media	12	21.43[3]	80	54.42[3]	
	No response	0	0.00	21	14.29	
	Total	**56**	**100.00**	**147**	**100.00**	
On average, how many patients do you perform root canal treatment on per day?	0	0	0.00	5	3.40	***0.001 ([4,5] <0.001, according to Bonferroni correction)***
	1-3	10	17.86[4]	89	60.55[4]	
	4-5	22	39.28[5]	40	27.21[5]	
	>5	24	42.86[5]	13	8.84[5]	
	Total	**56**	**100.00**	**147**	**100.00**	
What is the success rate of your treatments according to you?	0-10%	0	0.00	2	1.36	*0.182*
	25,0-50%	0	0.00	5	3.40	
	50,0-75%	8	14.29	56	38.10	
	75,0-100%	48	85.71	84	57.14	
	Total	**56**	**100.00**	**147**	**100.00**	
In routine endodontic treatment, do you prefer single-session or multiple-session treatment?	Multiple Sessions	16	28.57[6]	87	59.19[6]	***0.021 ([6] =0.016, [7] =0.028 according to Bonferroni correction)***
	Single Session	28	50.00[7]	48	32.65[7]	
	No preference	12	21.43	12	8.16	
	Total	**56**	**100.00**	**147**	**100.00**	
What are the reasons for multiple-session treatment?	To catch details missed in the first session	2	3.57	30	20.41	*0.280*
	To resolve complications in the first session	14	25.00	27	18.38	
	To apply medicaments	26	46.43	45	30.61	
	Because sessions are long	10	17.86	31	21.09	
	No response	4	7.14	14	9.51	
	Total	**56**	**100.0**	**147**	**100.0**	

*Significance levels according to the Chi-square test res

In contrast, the majority of general dentists (55 (37.41%)) believed it could be due to undetected canals significantly more than endodontists (21.43%, p=0.023). The answers to the question "When a patient who had treatment done by you one month ago and completed the treatment comes to your clinic with pain, what is your approach?" showed a statistically significant relationship with the "Area of expertise" (p<0.05). After Bonferroni correction, endodontists preferred retreatment in this situation (28 (50.00%)), while general dentists preferred it at a rate of 64 (43.54%), though this specific difference was not statistically significant (p=0.147). Notably, general dentists were more likely to refer to an endodontist (15.65% vs. 0.00%, p=0.002) in this situation. In addition, endodontists and general dentists stated that they would most commonly prescribe analgesics and antibiotics at rates of 20 (35.71%) and 50 (34.01%), respectively, with no significant difference (p=0.351).

Table 4. Relationship and distribution between "area of expertise" and "treatment approaches"

		Endodontist		General Dentist		*p-value
		n	%	n	%	
You treated a patient with irreversible pulpitis with single-session treatment. The patient returned 3 days later with pain and/or swelling. What is your approach?	Prescribe pain relievers and antibiotics	34	60.72	79	53.75	***0.004 ([1] =0.006, [2] <0.001 according to Bonferroni correction)***
	Remove the canal, call back in 2-3 days	4	7.14	8	5.44	
	Remove the canal, expand preparation, call back in 2-3 days	18	32.14[1]	15	10.20[1]	
	Remove the canal, expand preparation, apply medicament to the canal	0	0.00[2]	45	30.61[2]	
	Total	**56**	**100.00**	**147**	**100.00**	
You are applying multiple-session treatment to a patient with irreversible pulpitis. The patient returned with pain and/or swelling 3 days after the first session. What is your approach?	Prescribe pain relievers and antibiotics	6	10.72	26	17.69	*0.385*
	Open the canal, perform irrigation, and close	6	10.72	36	24.49	
	If medicament was used, clean it from the canals, schedule an appointment in 2-3 days	26	46.42	41	27.89	
	If medicament was used, clean it from the canals, expand preparation, reapply medicament	18	32.14	44	27.93	
	Total	**56**	**100.00**	**147**	**100.00**	
You performed single-session treatment on a tooth with acute/chronic apical periodontitis. The patient returned 3 days later with pain and/or swelling. What is your approach?	Extract the tooth	0	0.00	3	2.04	*0.301*
	Prescribe pain relievers and antibiotics	24	42.86	82	55.78	
	Remove the canal, call back in 2-3 days	4	7.14	9	6.12	
	Remove the canal, expand preparation, call back in 2-3 days	18	31.14	19	12.93	
	Remove the canal, expand preparation, apply medicament to the canal	10	17.86	34	23.13	
	Total	**56**	**100.00**	**147**	**100.00**	
You are applying multiple-session treatment to a tooth with acute/chronic apical periodontitis. The patient returned with pain and/or swelling 3 days after the first session. What is your approach?	Refer to an endodontist	0	0.00	8	5.44	*0.111*
	Prescribe pain relievers and antibiotics	6	10.71	33	22.45	
	If medicament was used, clean it from the canals, schedule an appointment in 2 days	8	14.29	36	24.49	
	If medicament was used, clean it from the canals, expand preparation, reapply medicament	26	46.43	51	34.69	
	If medicament was used, clean it from the canals, expand preparation	16	28.57	19	12.93	
	Total	**56**	**100.00**	**147**	**100.00**	
Patients returning due to pain, which group do they mostly belong to according to you?	Between sessions in teeth with no previous root canal treatment but treated with multiple sessions	14	25.00[3]	51	34.69[3]	***0.006 ([3] =0.039, [4] =0.044 according to Bonferroni correction)***
	After completion of treatment in teeth with no previous root canal treatment but treated with multiple sessions	0	0.00	11	7.48	
	Between sessions in retreated teeth	22	39.29[4]	45	30.61[4]	
	After completion of treatment in retreated teeth	6	10.71	3	2.05	
	Single-session completed treatments	14	25.00	37	25.17	
	Total	**56**	**100.00**	**147**	**100.00**	
When a patient comes to you with pain, what is the first thing that comes to your mind as the cause of pain related to treatment procedures?	Undetected canal	12	21.43[5]	55	37.41[5]	***0.031 ([5] =0.023, [6] <0.001 according to Bonferroni correction)***
	Inadequacy of restoration on top of root canal treatment	2	3.57	7	4.75	
	Presence of pulp remnants in the canal	2	3.57	28	19.07	
	Overflow of debris, irrigation solution, or canal filling materials from the canal	38	67.86[6]	45	30.61[6]	
	Insufficient filling	2	3.57	12	8.16	
	Total	**56**	**100.00**	**147**	**100.00**	
A patient who had treatment done 1 month ago and finished came to your clinic with pain in the relevant tooth. What is your approach?	Refer for apical resection	8	14.29	5	3.40	***0.030 ([7] =0.002 according to Bonferroni correction)***
	Extract the tooth	0	0.00	5	3.40	
	Refer to an endodontist	0	0.00[7]	23	15.65[7]	
	Prescribe pain relievers and antibiotics	20	35.71	50	34.01	
	Remove the canal, perform retreatment	28	50.00	64	43.54	
	Total	**56**	**100.00**	**147**	**100.00**	
A patient who had treatment done 1 year ago and finished came to your clinic with pain in the relevant tooth. What is your approach?	Refer for apical resection	10	17.86[8]	4	2.72[8]	***0.002 ([8] =0.003, [9] <0.001, [0]=0.004 according to Bonferroni correction)***
	Extract the tooth	2	3.57	15	10.21	
	Refer to an endodontist	0	0.00[9]	33	22.45[9]	
	Prescribe pain relievers and antibiotics	0	0.00	12	8.16	
	Remove the canal, perform retreatment	44	78.57[0]	83	56.46[0]	
	Total	**56**	**100.00**	**147**	**100.00**	

*Significance levels according to the Chi-square test result

Finally, a statistically significant relationship was observed between the answers to the question "When a patient who had treatment done by you one year ago and completed the treatment comes to your clinic with pain, what is your approach?" and the "Area of expertise" ($p<0.05$). Post-hoc tests revealed that general dentists, unlike endodontists, did not prefer apical resection (2.72% vs. 17.86%, $p=0.003$) but instead mostly referred the patient to an endodontist (33 (22.45%) vs. 0.00%, $p<0.001$). Most endodontists (44 (78.57%)) and general dentists (83 (56.46%)) most commonly preferred retreatment, with endodontists significantly more likely to choose this option ($p=0.004$). Since the participating dentists were evaluated in three different groups as endodontists, general dentists, and specialists from other departments, the compatibility of the answers given by dentists in both groups to the questions was evaluated using multiple correspondence analysis (Figure 1). It was observed that there was no compatibility between the answers of endodontists (1st quadrant) and general dentists.

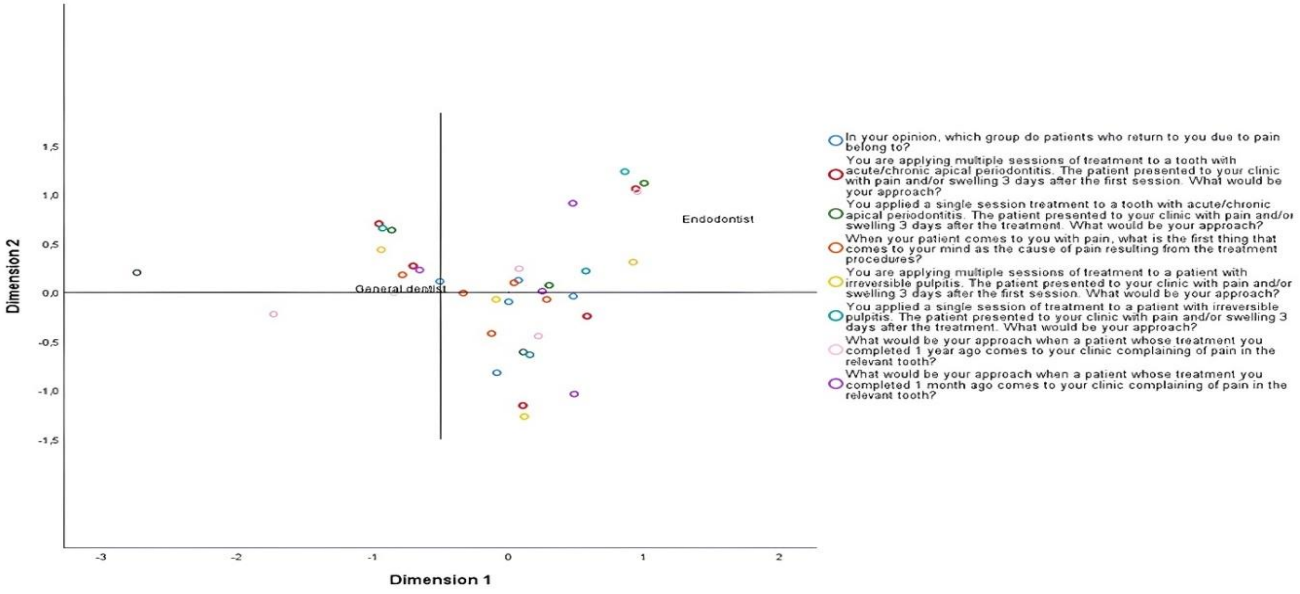

Figure 1. The compatibility of the answers given by dentists are shown by multiple correspondence analysis of the participating dentists in both groups as endodontists and general dentists

DISCUSSION

This study investigates the differences or similarities in the treatment approaches for patients presenting with pain among endodontists and general dentists through a survey. It is observed that general dentists play an important role in the provision of dental services in Türkiye, especially in private clinics (8). Despite the increasing number of graduating dentists each year in Türkiye, the insufficient number of endodontists has led to root canal treatment mainly being provided by general dentists (8). A specialization thesis conducted in 2019 found that approximately 97.2% of general dentists performed root canal treatments, with around 32.6% treating more than 20 cases per month (9). Similarly, Pertek Hatipoğlu et al. reported in their 2020 study that general dentists had a 96.45% rate of performing endodontic treatments, with an average of 3.25 cases treated per day (10). Consistent with these findings, our study indicates that the majority of general dentists work in private clinics, while endodontists are more commonly found in university hospitals. Moreover, we determined that approximately 96.6% of general dentists perform root canal treatments, treating at least one case daily. However, when evaluating the success rates of root canal treatments, we found that endodontists had a success rate of 75% or higher, with a rate of 85.7%, whereas general dentists had a success rate of 57.1% for the same criteria. This result suggests that the success rates of general dentists performing root canal treatments might be lower. However, it's essential to consider that the study is based on self-reported data and may not fully reflect the actual outcomes.

The role of social media in dentistry has become increasingly significant, mirroring its importance in people's lives. For various purposes such as advertising, marketing, patient communication, and education, dentists actively use social media (11). Studies have shown that dentists use social media to share their ideas and information to enhance their knowledge (11,12). In our study, a statistically significant difference was found using of social media as a method for following innovations in endodontics between endodontists and general dentists. Endodontists tend to follow current developments more through articles, while general dentists prefer social media to acquire up-to-date information. This difference could be attributed to the fact that endodontists in our study are more frequently associated with university positions, whereas general dentists are predominantly from private practice.

The fundamental difference between single-visit and multiple-visit root canal treatments lies in the use of intracanal medicament between sessions (13). A meta-analysis by Almeida et al. in 2017, covering 17 randomized clinical trials, demonstrated no significant difference in the healing of periapical tissues between single-visit and multiple-visit root canal treatments (14).

However, they reported that postoperative pain after single-visit root canal treatment was less, suggesting the logical adoption of single-visit root canal treatment, particularly in public oral health centers. In our study, approximately half of the endodontists preferred single-visit root canal treatment, while more than half of the general dentists favored multiple-visit root canal treatment. Kengel et al. reported that endodontists tend to have a more conservative approach in treatment planning, are more familiar with current endodontic literature, and perceive the difficulty level in the planning stage as lower than that of other dentists (15). As mentioned earlier, the majority of endodontists in our study work in university hospitals, which provide public health services. Therefore, factors such as patient volume and limited time allocated per patient might influence the preference for single-visit root canal treatment among endodontists, given their expertise and the potential for higher postoperative patient comfort. In contrast, the majority of general dentists included in our study work in private clinics, which may provide them with more flexibility in session durations and the ability to allocate more than one session for a patient. Additionally, some researchers have suggested that the use of intracanal medicament may be advantageous, especially in controlling microbial activity in the root canal system of non-vital teeth (16,17). Examining the results of our study, it is apparent that the most significant factor influencing the preference for multiple-visit root canal treatment among endodontists is the application of intracanal medicament. On the other hand, general dentists consider not only intracanal medicament but also shortening session durations and the ability to capture missed details in the first session as important factors in choosing multiple-visit root canal treatment. In conclusion, the preference for single-visit or multiple-visit root canal treatment is influenced not only by the knowledge and skills of the treating dentist but also by the time and working conditions they can allocate to the patient.

If pain or swelling occurs due to inflammation or infection originating from the pulp or periapical tissues during or after root canal treatment, this condition is classified as an emergency (18). The standard treatment method for such emergency cases involves expanding the preparation to provide drainage through the root canals, removing necrotic pulp remnants, or controlling pain (19). In cases of flare-up accompanied by pain and swelling, it is also recommended to prescribe analgesics and apply intracanal medicaments (19). In a survey conducted by Bidar et al. in 2015, including 120 general dentists and 32 endodontists, it was reported that over 75% of endodontists and less than 50% of general dentists preferred not to re-prepare the canal when encountering flare-up cases (6). In contrast to this study, our research prepared questions regarding when and under which initial indications flare-up cases occurred. We observed that the behavior of the participating dentists changed based on the initial indication, whether the treatment was performed in a single or multiple sessions, and the status of treatment completion. In cases of flare-up occurring three days after applying single-session root canal treatment to patients with irreversible pulpitis or acute/chronic apical periodontitis, endodontists mostly prescribed antibiotics and analgesics and less frequently performed re-preparation. Conversely, for cases of irreversible pulpitis, they did not prefer intracanal medicament, while for cases of acute/chronic apical periodontitis, they opted for medicament. General dentists, in similar situations, mostly prescribed antibiotics and analgesics, but unlike endodontists, approximately one-third chose re-preparation followed by intracanal medicament for flare-up cases following irreversible pulpitis. In cases of multiple-session treatment, endodontists mostly preferred to empty the canal and schedule a new appointment rather than prescribing antibiotics, whereas general dentists followed a similar approach but more frequently opted for irrigation only. Additionally, evaluation of the responses regarding when patients returned with pain in both groups showed that in cases of multiple-session treatments, patients often returned between sessions. Therefore, it is assumed that the behaviors and attitudes of the participating dentists reflected the situations they encountered more frequently. Furthermore, it was noted that dentists in both groups generally preferred re-preparation and subsequent intracanal medicament more for flare-up cases in multiple-session treatments compared to single-session treatments. This preference might be because these treatment methods are seen as more easily applicable options in an ongoing treatment process. Additionally, the fact that dentists in both groups did not have a preference for prescribing antibiotics alongside analgesics, even though this is not part of the standard treatment protocol, is noteworthy (19). Previous studies have reported higher rates of antibiotic prescriptions internationally for Türkiye (20,21) and Iran (7). In our study, general dentists tended to prescribe antibiotics at a similar or higher rate in various cases. However, cases requiring antibiotic use should involve common and severe endodontic infections, such as cellulitis, or situations suggesting systemic infection spread (22). Moreover, most endodontic diseases can be treated without antibiotics through chemo-mechanical canal debridement, appropriate pain control, medicament therapy, and, if necessary, drainage with incision (23,24). Therefore, considering these aspects, the results of our study suggest that antibiotic prescriptions may be more frequent than necessary.

Retreatment is a necessary treatment method for previously performed and unsuccessful root canal treatments. Additionally, in cases where periapical abscess has developed and coronal access cannot be provided for retreatment, apical resection is required (25). The results of the current study indicated that the dentists included in the study considered the time elapsed since the completion of treatment as a criterion when evaluating the failure of root canal treatment. In cases where patients returned with pain one year after treatment completion, endodontists planned retreatment in 78.5% of cases and apical resection in 17.9%. Additionally, 3.6% mentioned they prefer tooth extraction. However, when the treatment was completed one month ago, endodontists' behavior changed, and in such cases, approximately one-third preferred prescribing antibiotics and analgesics. In contrast, general dentists mentioned preferring apical resection in only 2.7% and retreatment in 56.5% of cases. It was also noteworthy that general dentists also had a tendency to consider prescribing antibiotics, with approximately one-third mentioning this preference. Despite the preference for

antibiotics in failed root canal treatments by dentists, it is not appropriate to prescribe them unless there is a systemic symptom in the standard treatment protocol (19). In this regard, it is considered necessary to provide more intensive education on limiting antibiotic use in both undergraduate and postgraduate dental education.

CONCLUSION

In conclusion, the behavior and attitude of the dentist performing the intervention during the treatment of pulpal and periapical infections are closely related to the level of expertise. Additionally, different clinical scenarios affect these behaviors. Whether the pain occurs during or after the treatment, the time until the pain occurs after the treatment, the level of education and knowledge of the physician affect both the success level of the physicians and the attitude they display towards the patient who presents with pain. The results of the current study provide evidence that both endodontists and general dentists prescribe antibiotics at high rates. It is necessary to improve the knowledge of dentists on root canal treatment standard protocols, antibiotics, and indications for antibiotic use through updated guidelines and undergraduate and postgraduate dental education.

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