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Evaluation of general dentists' perspectives on periodontal surgery

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Abstract

Aim: Periodontal treatments are a very important part of general dentistry. This study aimed to evaluate general dentists' perspectives on surgical and non-surgical periodontal treatments and to examine the decision criteria of these dentists to refer their patients to a periodontist.

Materials and Methods: The survey used in this study consisted of 28 questions and was delivered to general dentists online. The survey primarily asks dentists about their gender, age, information about the institution they work in, and years of professional experience. Other questions in the survey include topics related to periodontal examination, referral to a periodontist for Phase-1 periodontal treatment, referral for periodontal surgical treatment, surgical treatments applied and their frequency, and periodontal surgical treatment procedures.

Results: A total of 171 general dentists (85-male, 86-female) with an average age of 34±10 answered the survey questions. The rate of participants who stated that they performed the Phase-1 periodontal treatment of their patients themselves was 77.8%, while the rate of those who performed the surgical periodontal treatment themselves was 20.5%. No statistically significant relationships were obtained between the participants gender, the institution they work in, and their responses regarding periodontal diagnosis and treatments ($p>0.05$). The rates of performing a periodontal examination and obtaining a periodontal index in the first session are 70.1% and 38.0% for dentists working in private practice, while they are 44.1% and 14.7% for dentists working in a public hospital. In addition, it has been determined that all physicians who perform surgical treatments themselves work in private practice ($p<0.05$).

Conclusion: It has been determined that general dentists mostly apply non-surgical treatments themselves, but often refer them to a periodontist for surgical treatments. It was revealed that the working institution was effective in the decision to refer to a periodontist, but gender or professional experience was not effective.

Introduction

According to the European Federation of Periodontology, non-surgical periodontal treatment aims to eliminate supragingival and subgingival biofilm and calculus, and auxiliary physical, chemical, or host modulating agents, local or systemic antimicrobials can be used [1]. Surgical periodontal treatments aim to treat areas that do not respond sufficiently to non-surgical treatment and include periodontal flap surgery, resective and regenerative periodontal surgery interventions [1]. After completing periodontal diagnosis, non-surgical and surgical periodontal treatments, planning restorative and prosthetic treatments on a healthy periodontal basis is necessary for aesthetic and functional treatment success and patient satisfaction [2]. Periodontal disease treatment is the key point for long-term success for general dentists who plan to carry out all treatments of patients [3].

Various studies have shown that general dentists refer patients, especially those with advanced periodontal disease, to periodontist [4-6]. According to a study that analyzed how often general dentists referred their patients to peri-

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odontists, out of 160 survey participants, 16% did not refer any patients to a periodontist in the last month. Only 7% of the surveyed dentists referred 6 to 10 or more patients per month [5]. In another study, it was reported that general dentists perform non-surgical periodontal treatments of patients themselves, but they usually refer their patients to a periodontist for surgical treatments [3]. In a study investigating the factors affecting the general dentists' process of referring their patients to a periodontist, the most important factors were reported to be clinical skills and past positive experiences between the general dentist and the specialist [7]. In a survey study focusing on demographic variables in the referral process of general dentists to a periodontist, it was stated that female participants referred to a periodontist more frequently than male participants and general dentists working with another dentist made more frequent referrals to a specialist compared to dentists working alone [8]. General dentists who reported receiving a high-quality education demonstrated lower patient referral rates and a greater inclination towards treating patients in their own offices [9].

Existing studies have not adequately explored the factors that affect how general dentists approach both surgical and non-surgical periodontal procedures. Specifically, there is a gap in the research regarding the various factors that influence a dentist's decision-making process when it comes to treating periodontal surgery. The main purpose of this study is to evaluate general dentists' perspectives on periodontal treatment and their decision criteria for referring their patients to a periodontist.

Materials and Methods

Study design and setting

In this study, a survey form was used to evaluate general dentists' approaches and practices to periodontal surgery. Surveys were distributed electronically online. The survey form was sent to the participants via a link or e-mail. The data collection process continued between May 2023- July 2023, and the collected data were recorded in a database. Ethics committee approval for the study was received from Izmir Democracy University Non-Interventional Clinical Research Ethics Committee on 26.04.2023 with decision number 2023/05-09.

Participants and study size

Participants were randomly selected. Dentistry students and specialist dentists who have specialized in any department of dentistry and PhD students were excluded. A total of 171 participating dentists who answered the questions were included in the study. Participants selected one or more options depending on the design of the questions.

Data sources

The survey used in this study includes a total of 28 questions. The questions in the survey were prepared based on literature research and expert opinions [7,8]. Dentists who wanted to participate in the survey provided data by answering the questions.

The first 8 questions of the survey include demographic data of the participants; gender, age, years of working in dentistry, information about the institution where one works, and the number of dentists working in the institution.

Other questions in the survey are related to performing a periodontal examination on each patient, use of indexes in periodontal examination and preferred indexes, providing oral hygiene education, referral to a periodontist for Phase-1 periodontal treatment, referral to a periodontist for periodontal surgical treatment, surgical treatments applied and their frequency, and periodontal surgical treatment procedures.

Sample size

In the main hypotheses of the research, the relationships between independent variables were planned to be investigated, and the sample size was calculated at a 95% confidence level using the G Power-3.1.9.2 program. According to the analysis result, the minimum sample size of 152, based on a theoretical power of 0.80, α value of 0.05, and a standardized effect size of 0.30 (medium), due to the originality of the work.

Statistical analysis

In this study, descriptive statistics of the data, including number, percentage, mean, standard deviation, minimum, maximum, and median, were provided. In testing the relationship between categorical variables, when the sample size assumption was achieved (expected value 5), the Pearson Chi-Square test was applied, and the Fisher's Exact test was applied when the sample size assumption was not achieved. Multiple Chi-Square tests were used in the analysis of multiple-choice questions. A significance level of 0.05 was used. Significant difference if $p<0.05$, and no significant difference if $p>0.05$. Analyzes were carried out in the IBM SPSS 25 program.

Results

Demographic data

Demographic data of the participants are presented in Table 1. While 65.5% of the participants have been practicing dentistry for less than 10 years, 8% have more than 30 years of professional experience. While 19.9% of the participants work in public hospitals, 73.5% of these public hospitals are located in the central district. Those who reported working in a private practice owned by someone else are 55.5% of those working in a private practice/hospital. 24.8% of private practice dentists work alone. 34 work with 1-2 other dentists, 27 with 3-5, and 13 with 6-10.

Evaluation of survey questions

While 64.9% of the participants answered yes to the question "N1", 33.3% answered yes to the question "N2". The distribution of periodontal indices that the participants preferred to use is presented in Table 2, and the most frequently preferred indices were periodontal pocket depth at 84.2%, clinical attachment loss at 70.2%, bleeding index at 70.2%, and mobility at 64.9% (N3).

While 21.6% of the participants who answered the question "N4" answered yes, 93% of the participants answered yes

Table 1. Distribution of demographic characteristics of the participants.

				n	%
Gender	Male			85	49.7
	Female			86	50.3
How long have you been practicing dentistry?	0-10 years			112	65.5
	10-20 years			30	17.5
	20-30 years			15	8.8
	≥30			14	8.2
In which institution do you work?	Public hospitals			34	19.9
	Private practice/hospital			137	80.1
If you work in a private practice/hospital, please tick the option below that suits you.	I work in someone else's practice/hospital			76	55.5
	The practice/hospital belongs to me			62	45.3
Is there any dentist other than you working in a private practice/hospital?	Yes 105				76.6
	No			34	24.8
If yes, how many dentists other than you work?	1-2			48	45.7
	3-5			27	25.7
	6-10			13	12.4
If you work in public hospitals, please specify your district.	Central District			25	73.5
	Peripheral district			19	55.9
Age	Min	Max	Mean±SD.	n	Median
	23	72	34±10	171	30

to the question "N5" and 83% of the participants who answered the question "N6" selected the periodontal surgery option. Mucogingival problems (77.8%), gingival recession (62.6%), and gingival enlargement (53.3%) are the symptoms and findings that participants mostly prefer to refer to a periodontist. Additionally, the presence of periodontal abscesses is among the preferred options with a rate of 40.9%, the presence of deep pockets with a rate of 24%, and mobility with a rate of 29.2% (N7).

The rate of participants who stated that they do not perform periodontal surgery on their patients and that they refer their patients to a periodontist is 73.7% (S1). When patients referred to a periodontist were asked about the most common surgical procedure, the participants most frequently selected subgingival surgery and root planning (43.3%), followed by implant surgery (35.7%) and flap surgery (32.2%) (S2).

When asked which surgeries are performed by dentists who perform their surgical treatments, the most preferred operation is gingivectomy with 23.2%. The second and third most frequently preferred operations are implant surgery with 21.6% and subgingival surgery and root planning with 20.5%. The least selected options are mucogingival surgeries at 4.1%, resective bone surgery at 4.7%, gingivoplasty at 4.7%, and guided tissue regeneration at 5.8% (S3). While the rate of dentists choosing flap surgery was found to be 14.6%, the rate of dentists choosing crown lengthening surgery was found to be 12.3%. To the question "S14" 9.4% of dentists answered yes.

In question "S9", the most frequently preferred options are Gracey curette (19.9%) and ultrasonic scaler (12.3%), respectively. While 21 participants answered yes to the question "S10", 24 participants answered yes to the question "S6" To the question "S7", 34 dentists (19.9%) answered scalpel, 27 dentists (15.8%) answered laser, 18 dentists answered Kirkland and Orban gingivectomy blades (10.5%) and 7 dentists answered electrocautery (4.1%).

When the preferred membranes for guided tissue regeneration were questioned, 15 dentists (8.8%) preferred resorbable membranes, while four dentists (2.3%) preferred non-resorbable membranes (S11). When asked about the type of graft they frequently prefer, 11.7% of the participants selected autogenous, 11.1% selected allograft and 7% selected xenograft (S12). To the question "S13", 9.4% of the dentists answered alveolar crest ridge, 5.3% the tuber region, and 4.1% the exostosis, while the least preferred option was the symphysis region (2.9%).

General dentists' answers to the question "S5" were evaluated. While 20.5% of the participants responded, "I started surgeries after training on surgical treatments", 18.1% responded, "I perform surgical treatments according to my current knowledge" and 19.3% responded, "While I am continuing my training, I am performing surgical treatment".

When the relationships between the participants gender, the institution they work in, and their answers to questions about periodontal examination, diagnosis, and treatment were examined, no statistically significant relationship was obtained ($p>0.05$) (Table 3).

When the relationships between the institutions where dentists work and their answers to questions about periodontal examination, diagnosis, and treatments were examined, statistically significant differences were obtained in the answers given to periodontal examination and periodontal index questions by general dentists working in a private practice/hospital and those working in a public

Table 2. Distribution of participants according to their answers to questions about periodontal treatments.

Question code			n	%
N1	Do you perform a periodontal examination on each of your patients at their first visit?	Yes	111	64.9
		No	59	34.5
N2	Do you take a periodontal record or index when diagnosing your patients?	Yes	57	33.3
		No	113	66.1
N3	Yes, if you use periodontal index in your patients, what are they?	In cases where I see attachment loss, I check mobility and apply curettage treatment.	1	1.8
		Mobility	37	64.9
		CPITN	8	14
		Gingival index	29	50.9
		Bleeding index	40	70.2
		Clinical attachment loss	40	70.2
		Periodontal pocket depth	48	84.2
		Plaque index	30	52.6
N4	Do you refer your patients to a periodontist for Phase-1 periodontal treatments?	Yes, I refer you to a periodontist	37	21.6
		No, I do the treatments	133	77.8
N5	Do you provide oral hygiene training to your patients?	Yes	159	93.0
		No	12	7.0
N6	For which periodontal diseases do you refer to a periodontist?	Gingivitis	13	7.6
		Periodontal abscess	69	40.4
		Periodontal surgery	142	83
		Periodontitis	76	44.4
N7	With what signs and symptoms do you refer your patients to a periodontist?	Other mucogingival problems (Frenectomy etc.)	133	77.8
		Gingival enlargement	91	53.2
		Gingival recession	107	62.6
		Gingival bleeding	13	7.6
		Mobile teeth	50	29.2
		Presence of periodontal abscess	70	40.9
		Presence of periodontal pocket	41	24
		Gingival sensitivity	1	0.6
		Periodontal surgical procedures	1	0.6
		Generally severe cases of periodontitis	1	0.6
S1	Do you perform periodontal surgery treatments for your patients?	Other	10	5.8
		Yes, I perform surgical treatments	35	20.5
		No, I refer to a periodontist	126	73.7
S2	If you refer your patients to a periodontist for periodontal surgery treatment, what are the most common surgical treatments?	Flap surgery	55	32.2
		Frenectomy	34	19.9
		Gingivectomy	44	25.7
		Gingivoplasty	21	12.3
		Graft and membrane applications	33	19.3
		Implants	61	35.7
		Crown length extension	21	12.3
		Mucogingival surgery	33	19.3
		Resective bone surgery	18	10.5
		Subgingival surgery and root planning	74	43.3
		Guided tissue regeneration	28	16.4
S3	If you perform surgical treatments yourself. which of the following surgical operations do you perform?	Flap surgery	25	14.6
		Gingivectomy	40	23.4
		Graft and membrane applications	18	10.5
		Implants	37	21.6
		Subgingival surgery and root planning	35	20.5
		Frenectomy	14	8.2
		Gingivoplasty	8	4.7
		Crown length extension	21	12.3
		Resective bone surgery	8	4.7
		Guided tissue regeneration	10	5.8
		Mucogingival surgery	7	4.1

S4	How many times do you perform the surgical treatments you marked during the year?			
	Subgingival surgery and root planning	0-10	20	44.4
		20-30	13	28.9
		30+	12	26.7
	Gingivectomy	0-10	37	77.1
		20-30	5	10.4
		30+	6	12.5
	Gingivoplasty	0-10	20	58.8
		20-30	10	29.4
		30+	4	11.8
	Frenectomy	0-10	18	62.1
		20-30	7	24.1
		30+	4	13.8
	Flap surgery	0-10	14	43.8
		20-30	2	6.3
		30+	16	50.0
	Guided tissue regeneration	0-10	13	76.5
		20-30	1	5.9
		30+	3	17.6
	Graft and membrane procedures	0-10	14	53.8
		20-30	6	23.1
		30+	6	23.1
	Resective bone surgery	0-10	11	73.3
		20-30	2	13.3
		30+	2	13.3
	Mucogingival surgery	0-10	11	78.6
		20-30	1	7.1
		30+	2	14.3
	Crown length extension	0-10	22	81.5
		20-30	1	3.7
		30+	4	14.8
	Dental implants	0-10	5	9.3
		20-30	5	9.3
		30+	44	81.5
S5	Have you received training for the surgical procedures you perform?	While I am continuing to my training I am performing surgical treatment	33	19.3
		I started surgeries after training on surgical treatments	35	20.5
		I perform surgical treatments according to my current knowledge	31	18.1
S6	Do you apply periodontal dressing after gingivectomy?	Sometimes	1	0.6
		Yes	24	14.0
		No	27	15.8
S7	What are the tools you use in the gingivectomy procedure?	Scalpels	34	19.9
		Gingivectomy blades (Kirkland and Orban)	18	10.5
		Lasers	27	15.8
		Electrocautery	7	4.1
S8	Do you perform surgery in the treatment of bone defects?	Yes	21	12.03
		No	16	9.4
S9	Which method do you use to clean the root surface in periodontal flap surgery?	Gracey curette	34	19.9
		Ultrasonic scaler	21	12.3
		Laser	5	2.9
		Chemical method	1	0.6
S10	Do you use vertical incisions in periodontal flap surgery?	Yes	21	12.3
		No	16	9.4
S11	What are the membranes you prefer for guided tissue regeneration?	Non-resorbable membranes	4	2.3
		Resorbing membranes	15	8.8
S12	What is the type of graft you often prefer?	Allograft	19	11.1
		Alloplastic graft	2	1.2
		Autogengraft	20	11.7
		Xenograft	12	7
S13	If you use an autogenous bone graft, from which areas do you prefer to take it?	Exostoses	7	4.1
		Symphysis	5	2.9
		Tuber	9	5.3
		Alveolar crest ridge	16	9.4
S14	Do you perform mucogingival surgery around implants?	Yes	16	9.4
		No	43	25.1

N: Non-surgical, S: Surgical

Table 3. Relationships between participants gender and their answers to questions about periodontal treatments.

		Male			Female				
		n	%	G.%	n	%	G.%	Test Statistics	p
In which institution do you work?	Public hospitals	15	44.1	17.6	19	55.9	22.1	0.813	0.367
	Private practice/hospital	70	51.1	82.4	67	48.9	77.9		
If you work in a private practice/hospital, please tick the option below that suits you.	I work in someone else's practice/hospital	33	44.0	47.1	42	56.0	62.7	3.338	0.068
	The practice/hospital belongs to me	37	59.7	52.9	25	40.3	37.3		
Is there any dentist other than you working in a private practice/hospital?	Yes	50	47.6	58.8	55	52.4	64.0	1.416	0.493
	No	20	58.8	23.5	14	41.2	16.3		
Do you perform a periodontal examination on each of your patients at their first visit?	Yes	50	45.0	58.8	61	55.0	70.9	4.049**	0.089
	No	35	59.3	41.2	24	40.7	27.9		
Do you take a periodontal record or index when diagnosing your patients?	Yes	26	45.6	30.6	31	54.4	36.0	2.590**	0.462
	No	59	52.2	69.4	54	47.8	62.8		
Do you refer your patients to a periodontist for Phase-1 periodontal treatments?	Yes, I refer you to a periodontist	20	54.1	23.5	17	45.9	19.8	1.248**	0.639
	No, I do the treatments.	65	48.9	76.5	68	51.1	79.1		
Do you perform periodontal surgery treatments for your patients?	Other	4	40.0	4.7	6	60.0	7.0	2.077**	0.350
	Yes, I perform surgical treatments.	21	60.0	24.7	14	40.0	16.3		
	No, I refer to a periodontist	60	47.6	70.6	66	52.4	76.7		
Have you received training for the surgical procedures you perform?	While I am continuing to my training I am performing surgical treatment	18	54.5	45.0	15	45.5	53.6	1.288***	0.732
	I started surgeries after training on surgical treatment	21	60.0	52.5	14	40.0	50.0		
	I perform surgical treatments according to my current knowledge	20	64.5	50.0	11	35.5	39.3		

**Fisher's Exact test, ***Multiple Chi Square test, %: Row percentage and G.%: Column percentage for gender.

hospital ($p<0.05$).

It was determined that 70.1% of dentists working in private practice/hospital performed a periodontal examination during their first examination and 38.0% took a periodontal record or index when diagnosing their patients. It was found that 44.1% of dentists working in public hospitals performed a periodontal examination during their first examination and 14.7% took a periodontal record or index when making a diagnosis. There was no statistically significant difference in the response to the question of referral to a periodontist for Phase-1 periodontal treatment. ($p>0.05$) On the other hand, it was observed that all of the people who answered "I do the surgical treatments" were working in a private practice/hospital, while 26.2% of those who answered "no" were working in a public hospital ($p<0.05$) (Table 4).

When the relationships between the participant's working experience and their answers to questions about the periodontal examination, diagnosis, and treatments were examined, it was seen that dentists with less than 10 years of professional experience mostly worked in someone else's private practice/hospital, and as their working expe-

Table 4. Relationships between the institution where the participants work and their answers to questions about periodontal treatments.

		Public hospitals			Private practice/hospital				
		n	%	I.%	n	%	I.%	Test Statistics	p
Do you perform a periodontal examination on each of your patients at their first visit?	Yes	15	13.5	44.1	96	86.5	70.1	8.533	**0.007***
	No	19	32.2	55.9	40	67.8	29.2		
Do you take a periodontal record or index when diagnosing your patients?	Yes	5	8.8	14.7	52	91.2	38.0	7.514	**0.015***
	No	29	25.7	85.3	84	74.3	61.3		
Do you refer your patients to a periodontist for Phase-1 periodontal treatments?	Yes, I refer you to a periodontist	12	32.4	35.3	25	67.6	18.2	4.838	0.079
	No, I do the treatments.	22	16.5	64.7	111	83.5	81.0		
Do you perform periodontal surgery treatments for your patients?	Other	1	10.0	2.9	9	90.0	6.6	12.446	**0.002***
	Yes, I perform surgical treatments.	0	0.0	0.0	35	100.0	25.5		
	No, I refer to a periodontist	33	26.2	97.1	93	73.8	67.9		
Have you received training for the surgical procedures you perform?	While I am continuing to my training I am performing surgical treatment	1	3.0	50.0	32	97.0	48.5	2.203***	0.531
	I started surgeries after training on surgical treatment	0	0.0	0.0	35	100.0	53.0		
	I perform surgical treatments according to my current knowledge	1	3.2	50.0	30	96.8	45.5		

*p<0.05, ***Multiple Chi Square test, %: Row percentage and I.%: Column percentage for the institution.

rience increased, the rate of working in their private practice/hospital increased. Additionally, dentists who have worked for less than 10 years often work with other dentists ($p<0.05$). There was no statistically significant difference between the years of professional experience and the answers to questions about referral to a periodontist for Phase-1 periodontal treatment, performing periodontal surgical treatments, and training received for surgical procedures ($p>0.05$) (Table 5).

Discussion

This survey study, it was aimed to evaluate the general dentists' perspectives on periodontal treatments and to evaluate the effects of the participants' demographic data on the decision to refer patients to a periodontist, as a result, it was determined that 77.8% of general dentists applied non-surgical treatments themselves, but 76.7% referred their patients to a periodontistfor surgical treatments. In addition, it was revealed that the institution where the dentist worked was effective in the decision to refer to a periodontist, but gender or professional experience was not effective.

According to reports, a significant majority of general dentists, approximately 95%, offer non-surgical periodontal treatment. However, these professionals tend to exhibit reluctance when it comes to undertaking periodontal and implant surgical treatments [10]. In our study, 77.8% of the participants stated that they carried out the Phase-1 treatment themselves. In addition, while this rate was 64.7% for dentists working in public hospitals, it was 82% for general dentists working in private practice/hospital. In addition, the private practice/hospital study of all participants who stated that they performed periodontal surgical treatments themselves shows that general dentists working in private practice/hospital are more reluctant to refer patients to specialist periodontists compared to their colleagues working in public hospitals.

In studies in the literature, the rate of general dentists performing routine periodontal examinations varies between 80% and 95% [11]. In our study, this rate is lower than

Table 5. Relationships between participants' professional experiences and their answers to questions about periodontal treatments.

		0-10 years			10-20 years			20-30 years			≥30 years				
		n	%	P.E. %	n	%	P.E.%	n	%	P.E. %	n	%	P.E. %	Test Statistics	p
In which institution do you work?	Public hospitals	25	73.5	22.3	7	20.6	23.3	1	2.9	6.7	1	2.9	7.1	3.258**	0.351
	Private practice/hospital	87	63.5	77.7	23	16.8	76.7	14	10.2	93.3	13	9.5	92.9		
If you work in a private practice/hospital, please tick the option below that suits you.	I work in someone else's practice/hospital	66	88.0	75.9	7	9.3	30.4	2	2.7	14.3	0	0.0	0.0	51.926	**0.000***
	The practice/hospital belongs to me	21	33.9	24.1	16	25.8	69.6	12	19.4	85.7	13	21.0	100.0		
Is there any dentist other than you working in a private practice/hospital?	Yes	76	72.4	67.9	17	16.2	56.7	8	7.6	53.3	4	3.8	28.6	23.520**	**0.000***
	No	12	35.3	10.7	7	20.6	23.3	6	17.6	40.0	9	26.5	64.3		
Do you perform a periodontal examination on each of your patients at their first visit?	Yes	68	61.3	60.7	22	19.8	73.3	11	9.9	73.3	10	9.0	71.4	8.00**	0.281
	No	44	74.6	39.3	7	11.9	23.3	4	6.8	26.7	4	6.8	28.6		
Do you take a periodontal record or index when diagnosing your patients?	Yes	38	66.7	33.9	10	17.5	33.3	5	8.8	33.3	4	7.0	28.6	5.288**	0.618
	No	74	65.5	66.1	19	16.8	63.3	10	8.8	66.7	10	8.8	71.4		
Do you refer your patients to a periodontist for Phase-1 periodontal treatments?	Yes, I refer to a periodontist	25	67.6	22.3	5	13.5	16.7	5	13.5	33.3	2	5.4	14.3	6.970**	0.406
	No, I do the treatments.	87	65.4	77.7	24	18.0	80.0	10	7.5	66.7	12	9.0	85.7		
Do you perform periodontal surgery treatments for your patients?	Other	7	70.0	6.3	2	20.0	6.7	0	0.0	0.0	1	10.0	7.1	1.372**	0.986
	Yes, I perform surgical treatments.	22	62.9	19.6	7	20.0	23.3	3	8.6	20.0	3	8.6	21.4		
	No, I refer to a periodontist	83	65.9	74.1	21	16.7	70.0	12	9.5	80.0	10	7.9	71.4		
Have you received training for the surgical procedures you perform?	While I am continuing to my training I am performing surgical treatment	21	63.6	53.8	9	27.3	60.0	1	3.0	16.7	2	6.1	25.0	9.797***	0.367
	I started surgeries after training on surgical treatment	18	51.4	46.2	10	28.6	66.7	3	8.6	50.0	4	11.4	50.0		
	I perform surgical treatments according to my current knowledge	16	51.6	41.0	6	19.4	40.0	4	12.9	66.7	5	16.1	62.5		

*p<0.05, **Fisher's Exact test, ***Multiple Chi Square test, %: Row percentage and P.E.%: Column percentage for professional experience.

the literature at 64.9%. When the relationship between the institution they work in and periodontal examination and periodontal index rates is examined, it is seen that dentists working in private practice/hospital are more motivated to perform periodontal examinations and obtain index records.

One study reported that dentists between the ages of 31 and 45 were more likely to refer patients to a periodontist for treatment, while dentists younger than 30 were more likely to treat periodontal diseases, and this was probably related to their more up-to-date knowledge [12]. Similarly, a study reported that general dentists with fewer years of experience provided more periodontal treatments [13]. On the other hand, another study stated that there was no relationship between dentists' age or years of practice and referral to a specialist [8]. In our study, the rates of performing periodontal examination, obtaining periodontal index, and referring to a periodontist for Phase-1 periodontal treatment or surgical treatment are similar to the years of employment in the profession. It could be expected that the increase in the professional experience and the rate of working in the private practice/hospital, especially the increase in the number of dentists working in their own offices, would increase the frequency of periodontal treatment, but the fact that the fewer professional experience and the up-to-dateness of the information learned increases the motivation to perform treatment may have caused the rates of referral to periodontist to be similar.

While it was reported in a case-based survey study that the most frequently measured clinical parameters to diagnose periodontal disease were pocket depth and mobility, the most frequently measured indices in our study were periodontal pocket depth, followed by attachment loss, bleeding index, and mobility [11]. Since pocket depth and attachment loss are indispensable criteria for diagnosing periodontal disease and determining the severity of periodontitis, and bleeding on probing is the first clinical sign of gingival inflammation, dentists' preferences seem appropriate. However, it was found that 85.3% of general dentists working in public hospitals did not receive any periodontal index. None of the participants working in a public hospital stated that they performed periodontal

surgical treatments themselves. It is thought that this low rate of periodontal index recording may affect the determination of the need for periodontal surgical treatments. In a survey study, it was reported that the frequency of use of probable pocket depth measurement decreased as the clinical experience of general dentists increased [14]. On the other hand, it seems that professional experience has no effect on index recording in our study.

In numerous studies, gingivectomy has been identified as the most frequently performed periodontal surgery by general dentists [4,15,16]. In our study, gingivectomy is the most preferred operation option by general dentists who perform their own surgical treatments. It can be thought that the gingivectomy operation increases the dentists' willingness to perform the treatment because it is relatively easy to perform and has a low risk of complications. Scalpel (19.9%) and laser (15.8%) were mostly preferred by general dentists for gingivectomy operation. Scalpel may have been preferred due to its ease of application and minimal damage to periodontal tissue, while laser may have been preferred to ensure less bleeding and shorter surgery time. In addition, the fact that general dentists have easier access to scalpels may have contributed to this being the most frequently preferred option.

In a cross-sectional survey study, it was reported that 50% of general dentists referred their patients to a periodontist for implant surgeries [17]. In our study, the fact that the second most preferred operation was implant surgery (21.6%) and that 81.5% of the dentists who performed implants applied 30+ implants in a year shows that general dentists are motivated to perform implant treatment.

When the frequency of mucogingival surgeries, which are the least preferred by the participants (4.1%), is examined, it is seen that 78.6% of the dentists perform less than 10 surgeries in a year. It is thought that the reason why mucogingival surgeries are less preferred and the dentists who do prefer them perform a small number of operations per year may be due to the technical difficulties of the operations and the lack of diagnosis of patients with indications for surgery.

Studies have reported that the use of non-resorbable membranes is technically more difficult and may cause complications if exposed to the mouth [18]. In our study, resorbable membranes were preferred more frequently than non-resorbable membranes in guided tissue regeneration. The relative ease of use of resorbable membranes and the fact that they do not require a second operation to remove the membrane may have been effective in the choice of membrane by general dentists. In a recent review, it was reported that autogenous grafts are considered the gold standard in periodontology due to their osteogenic, osteoinductive, and osteoconductive properties, but advancing technology and the development of allograft preparation techniques have increased the use of allografts [19]. In our study, consistent with the literature, the most frequently preferred bone grafts were autogenous and allograft.

As per a recent study, the presence of a periodontal pocket of 6 mm or more, tooth mobility, and lack of any improvement after treatment were reported as clinical factors affecting the referral process of general dentists to a periodontist [20]. In our study, the most frequently selected symptoms for referral to a periodontist were mucogingival problems, gingival recession, and gingival enlargement. The fact that mucogingival surgeries are the least preferred operations by general dentists and that mucogingival problems are the most frequently referred symptom to a periodontist suggests that general dentists have the perspective that mucogingival operations require expertise.

In a study in which 82.7% of the participants were male, it was reported that female general dentists had a higher performance in referring patients to periodontists compared to male dentists [8]. However, in our study, which included almost equal female (86) and male (85) participants, it was observed that gender did not affect the decision to perform a periodontal examination, Phase-1 treatment, surgical treatment, or refer to a periodontist. The gender distribution is similar in the answers given to the question of whether they have received training for the surgical treatments they perform. It was also found that there was no relationship between gender, institution, and professional experience.

According to the results of a survey, a majority of general dentists, approximately 50.9%, reported working independently in their practices. Meanwhile, around 30.4% of the surveyed dentists mentioned that they worked with another dental professional [8]. Studies have reported that the number of dentists working alone has decreased in the last 25 years and dentists work together in larger practices and hospitals [21]. In the United States, while 70% of general dentists were working alone in 1986, this rate decreased to 57% in 2012 [22]. In our study, 24.8% of dentists working in private practice work alone, and with this current data, it is seen that general dentists in Turkey have caught up with the trend of working together, similar to the rest of the world.

The number of participants in the survey was similar to the examples in the literature, but stronger data could have been obtained with a higher number of participants. Necessary steps were taken to increase participation in the survey, and the justification and importance of the study were emphasized in the cover letter of the survey, and the shortness of the survey was aimed to motivate the participants. Due to the nature of survey studies, the data were based on the answers of the participants. However, in a study in the literature, it was reported that participants tended to overreport the quality or benefit of the treatment practices they performed [23]. It was also stated in a previous study that dentists who do not perform any periodontal treatment may be more likely to not complete the survey [13]. This may have affected the study's responses. Another limitation of this study is that it has not been revealed what affects dentists' decision to choose the periodontist they refer their patients to. Another limitation of the study is that it does not include details about questions related to the use of grafts and membranes in surgeries within the scope of implant surgeries or periodontitis treatment. The rate of periodontal surgical treatments performed by general dentists, their frequency of performing them, and which surgeries they prefer more frequently are reported in this study, but it does not contain information about the frequency of complications encountered by

these dentists in the surgical procedures they perform and their strategies for managing these complications, and this deficiency is among the limitations of the study. To better understand the perspectives of general dentists, there is a need for studies with larger samples in which the criteria they pay attention to when choosing the periodontist they refer their patients to are questioned in more detail. This could help to shed more light on the decision-making process and factors that influence the referral of patients to periodontists, thereby improving the quality of periodontal treatments.

Conclusion

Within the limitations of this study, it was revealed that the majority of general dentists perform a periodontal examination and almost all of them provide oral hygiene training. It has been determined that general dentists mostly perform Phase-1 periodontal treatments of their patients themselves, but they often prefer to refer them to a periodontist for surgical treatments. In addition, the rate of performing surgical periodontal treatments by general dentists working in private practice was found to be much higher than dentists working in public hospitals. It has been determined that gender and professional experience do not affect referral decisions to a periodontist.

Ethical approval

The study was approved by Izmir Democracy University Non-Interventional Clinical Research Ethics Committee (Ethics no: 2023/05-09, date 26.04.2023).

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