

Overview of Vital Teeth Bleaching Methods and Utilized Materials by Dentists

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Abstract

BACKGROUND/AIMS: This study aimed to determine the perspectives of dentists practicing in Türkiye on vital bleaching treatments, their preferences regarding application methods and materials, and to evaluate the obtained data with a cause-and-effect relationship.

MATERIALS AND METHODS: A survey designed to collect data on the perspectives and preferences of dentists and administered online using Google Forms. Voluntary dentists reached the form after filling out the consent form. All analyses were performed using SPSS version 21.0 software (SPSS Inc., Chicago, IL, USA). The Pearson's chi-square test was used to compare categorical variables. A p value <0.05 was considered statistically significant.

RESULTS: Among the participating dentists, 58.5% practiced vital bleaching and office bleaching, the most preferred method (84.5%) in all groups. There was a correlation between the sector and the "single session" preference ($p < 0.001$). There was a relationship between specialization status and "light activation" preference ($p = 0.001$). General dentists preferred it more than specialist dentists. Dentists working in the private sector reported more experience about pain, sensitivity, and irritation of soft tissues after bleaching than those working in the public.

CONCLUSION: Vital office bleaching is the most effective method. Dentists generally prefer to apply 2 sessions and light device activation. Additionally, they generally wait 14 days for restoration after bleaching. Dentists in the private sector are more likely to experience side effects than those in the public sector.

Keywords: Dental health survey, dentistry, teeth bleaching

INTRODUCTION

A beautiful smile is recognized as one of the most effective tools in one's social life. Dentistry has evolved from the past to the present to provide patients with healthier, more functional, and esthetically satisfying teeth. The impact of social media and digital photography has increased the desire to have snow-white teeth and an attractive smile among patients who seek esthetic dentistry in addition to healthy teeth.

Metabolic disorders, hereditary diseases, iatrogenic causes, such as tetracycline and fluorosis, trauma, and aging, can cause tooth discoloration. It also occurs when external staining factors adhere to the surfaces of the teeth.¹ Vital tooth bleaching is the process of

lightening the color of the teeth in the clinic or at home by oxidation of the organic chromophores that settle in the dental hard tissues by free radical molecules as a content of various chemicals applied to the discolored teeth.²

The mechanisms involved in the decolorization of chromophores, which are the structures primarily responsible for tooth discoloration, are the opening of their double carbon bonds, the breaking of the conjugated chain to form shorter chains, and the oxidation of other chemical moieties in the chain.² The bleaching mechanism involves the formation of free oxygen (O_2) and peroxide (HO_2) from active hydrogen peroxide. These unstable free radicals diffuse into the interprismatic

To cite this article: Başan Tosun M, Yaman BC, Tepe H, Çeliksöz Ö. Overview of Vital Teeth Bleaching Methods and Utilized Materials by Dentists. Cyprus J Med Sci. 2024;9(6):390-397

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Received: 04.03.2024

Accepted: 23.05.2024



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spaces in the enamel and are transported to the outer surface of the tooth by the foaming up of the pigmented molecules into small fragments. As the pigmented molecules are removed, the color of the tooth appears lighter.³

The most reliable and professional method of vital tooth bleaching treatment is office bleaching, which is performed by a dentist in a clinic. Since the concentration of hydrogen peroxide applied is high, the bleaching result can be visible quickly depending on the rate of free radical formation.⁴ The home bleaching method is a method that patients can apply at home with carbamide peroxide or lower concentrations of hydrogen peroxide placed in plaques specially prepared by the dentists.⁵ Continuation of the bleaching treatment by the patient at home, which was initiated by the dentist in the clinic, is a combined office and home bleaching method.⁶ The microabrasion technique is the controlled removal of material from the colored superficial enamel layer with the help of an acidic and abrasive paste containing 6-6.6% hydrochloric acid and silicon carbide microparticles.⁷

In the in-office bleaching method, high levels of hydrogen peroxide are applied with or without additional activation by heat, light, or laser. Today, halogen and plasma arc light devices are not preferred due to their impracticality and potential to emit infrared light.⁸ Light emitting diode (LED) devices developed in parallel with technological developments can effectively perform bleaching with bleaching mode as well as resin polymerization.⁹ There are also studies showing that led lights don't have any effect on bleaching efficacy check that literature.¹⁰ With the violet LED devices produced with the latest technology, bleaching can be done safely with only light activation without the need for chemical agents.⁹

Among the complications of vital tooth bleaching treatments, sensitivity is the most common. One of the main reasons is that the end products of the peroxide diffuse into the dentinal tubules and reach the pulp, and the other is that the glycerin in the agents dehydrates the teeth due to its hydrophilic structure.⁸ Burns may occur as a result of contact of the caustic agents used in vital bleaching with surrounding soft tissues.¹¹ If the bleaching agent is highly concentrated or in contact with the tooth for a long time, the organic matrix is destroyed as a result of calcium and phosphate loss. In addition, the physical properties of enamel, such as its microhardness and wear resistance, are weakened. Due to its hydrophilic nature, the bleaching agent absorbs water from the resin composite components, resulting in changes in the form of increased surface roughness and porous areas.¹² In the home-type vital teeth bleaching method, temporomandibular joint (TMJ) damage may occur as a result of using the plaque for a long time or not being prepared in accordance with the patient's dentition. The toxicity of properly applied bleaching treatment is limited to the oral cavity and rendered harmless by the body's defense systems.¹¹

After vital bleaching treatment, it is necessary to wait from 24 hours to 3 weeks for adhesive procedures due to the weakened bond strength of enamel to adhesive systems and reduced resin tags.¹² Since free oxygen reagents also act as polymerization inhibitors, they negatively affect the polymerization and bonding of resin adhesives in the early post-bleaching period. According to the results of recent studies, the application of antioxidants at the end of bleaching treatment allows restoration to be performed in the same session. After bleaching, antioxidant agents such as ascorbic acid, catalase, alpha-tocopherol, or sodium ascorbate are used to increase the enamel adhesive bond strength.^{13,14}

Clinical and *in vitro* studies on vital tooth bleaching have been conducted for many years. In addition to advances in methods and materials, it is critical for dentists to keep pace with these developments. For this reason, surveys among dentists are becoming increasingly important. In the survey studies on bleaching treatment conducted so far, a limited number of studies have provided limited information, including questions about the rate of patients' visits to dentists with bleaching requests, chemical bleaching agent preferences, and vital bleaching method preferences. Thus, the aim of this study was to investigate the approaches and material method preferences of different categories of dentists for bleaching vital teeth for various reasons. This study also aimed to compare the data obtained from dentists who were grouped according to specialty status, duration of experience, and sector in which they work.

MATERIALS AND METHODS

The study protocol was approved by Eskişehir Osmangazi University Non-Interventional Clinical Research Ethics Committee (approval number: 49, date: 15.02.2022).

This web-based questionnaire was developed by the researchers after a comprehensive literature review of previous studies. The model was tested for content and face validity. The survey was created using Google Forms. The data were sent to dentists via e-mail and social media using the databases of the Association of Restorative Dentistry and the Turkish Dental Association. The survey was displayed on the screen after the dentists acknowledged that they had given their consent to participate in the study. The survey consisted of 15 questions. The first part of the survey was including 7 sociodemographic questions about the dentists' gender, title, age, year of graduation, specialization, professional experience, length of time working as a dentist, and where they work. The second part consisted of 8 questions about vital bleaching. Because these questions included multiple-choice options, more results were obtained than the number of participants. The data were analyzed in this way. Information such as identity information and e-mail addresses were not asked of the dentists. A total of 518 dentists completed the survey.

Statistical Analysis

All analyses were performed using SPSS version 21.0 software (SPSS Inc., Chicago, IL, USA). The pearson's chi-square test was used to compare categorical variables. The categorical variables are expressed as frequencies and percentages. A p value <0.05 was considered statistically significant.

RESULTS

The responses of 518 participants were analyzed. The general sociodemographic information about the participants is presented in Figure 1. When asked, "Do you perform vital bleaching?" 41.5% of dentists answered "yes" and 58.5% answered "no" (Figure 1). The most preferred method was found to be "Office bleaching method" with a preference rate of 84.5%. The data for this question are presented in Figure 2.

The answers to the question "Which type of vital teeth bleaching method do you prefer?" were compared according to the professional experience, sector, and specialization status of the dentists. The obtained data are presented in Table 1. There was a relationship between

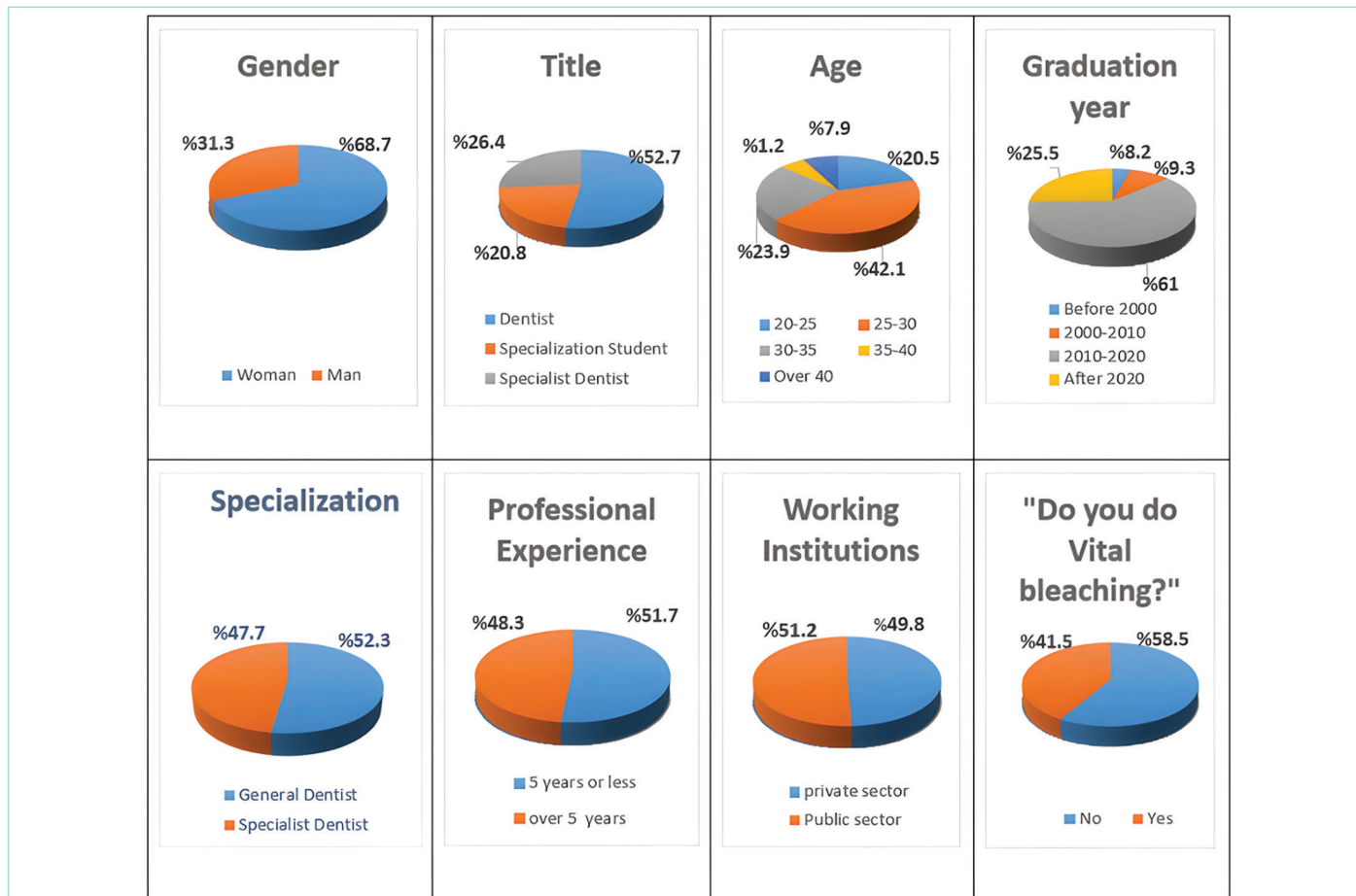


Figure 1. Basic descriptive information about the dentists and the distribution of dentists who perform vital tooth bleaching.

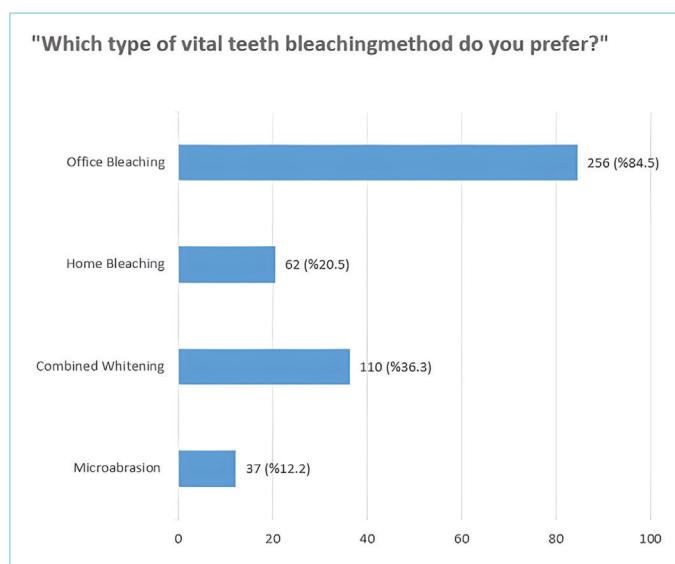


Figure 2. Distribution of the vital bleaching methods used by the surveyed dentists.

professional experience and home bleaching ($p=0.010$). There was a relationship between professional experience and combined office and home bleaching ($p=0.032$). There was a relationship between the

sector in which dentists work and combined office and home bleaching ($p=0.015$). There was a correlation between the specialty status of dentists and home bleaching ($p=0.010$). Specialized dentists performed home bleaching and combined office and home bleaching at a higher rate than general dentists ($p=0.010$) (Table 1).

The most preferred bleaching brand by dentists was “Ultradent Opalescence Boost PF 40% Hp Office Whitening” (Ultradent Inc, South Jordan, USA) with a rate of 59.4%. The second most preferred bleaching brand was “FGM Whiteness HP 35% Hp Office Whitening” (Joinville, SC, Brazil), with a rate of 38.3% (Figure 3).

The answers to the question “How many sessions of office bleaching do you perform?” were compared according to the professional experience, specialization status, and sector in which the dentists work. The obtained data are presented in Table 2. There was a relationship between the sector in which dentists worked and single-session teeth bleaching treatment ($p<0.001$). There was a correlation between the sector in which dentists worked and 2-session teeth bleaching treatment ($p<0.001$). General dentists preferred single-session bleaching treatment more than specialist dentists ($p<0.001$) (Table 2).

The answers to the question “What do you use as activator during the bleaching process?” were compared according to their professional experience, specialization status, and sector in which they worked. The obtained data are presented in Table 3. There was a relationship

Table 1. Comparison of the answers to the question “Which type of vital teeth bleaching method do you prefer?” according to the interaction groups of specialty, place of work, and working time

Variables	Office bleaching		p	Home bleaching		p	Combined office and home bleaching		p	Microabrasion		p
	Yes, (n %)	No, (n %)		Yes, (n %)	No, (n %)		Yes, (n %)	No, (n %)		Yes, (n %)	No (n %)	
Professional experience												
≤5	58 (21.6%)	210 (78.4%)	0.289	19 (7.1%)	249 (92.9%)	0.010*	45 (16.8%)	223 (83.2%)	0.032*	36 (13.4%)	232 (86.6%)	0.625
>5	64 (25.6%)	186 (74.4%)		35 (14%)	215 (86%)		61 (24.4%)	189 (75.6%)		30 (12.0%)	220 (88.0%)	
Working institutions												
Public sector	53 (20.4%)	207 (79.6%)	0.088	27 (10.4%)	233 (89.6%)	0.976	42 (16.2%)	218 (83.8%)	0.015*	35 (13.5%)	225 (86.5%)	0.622
Private sector	69 (26.7%)	189 (73.3%)		27 (10.5%)	231 (89.5%)		64 (24.8%)	194 (75.2%)		31 (12.0%)	227 (88.0%)	
Specialization												
General dentist	58 (21.6%)	210 (78.4%)	0.289	19 (7.1%)	249 (92.9%)	0.010*	45 (16.8%)	223 (83.2%)	0.032*	36 (13.4%)	232 (86.6%)	0.693
Specialist dentist	64 (25.6%)	186 (74.4%)		35 (14.0%)	215 (86.0%)		61 (24.4%)	189 (75.6%)		30 (12.0%)	220 (88.0%)	

(n %): Categorical variables are expressed as frequencies and percentages, respectively.

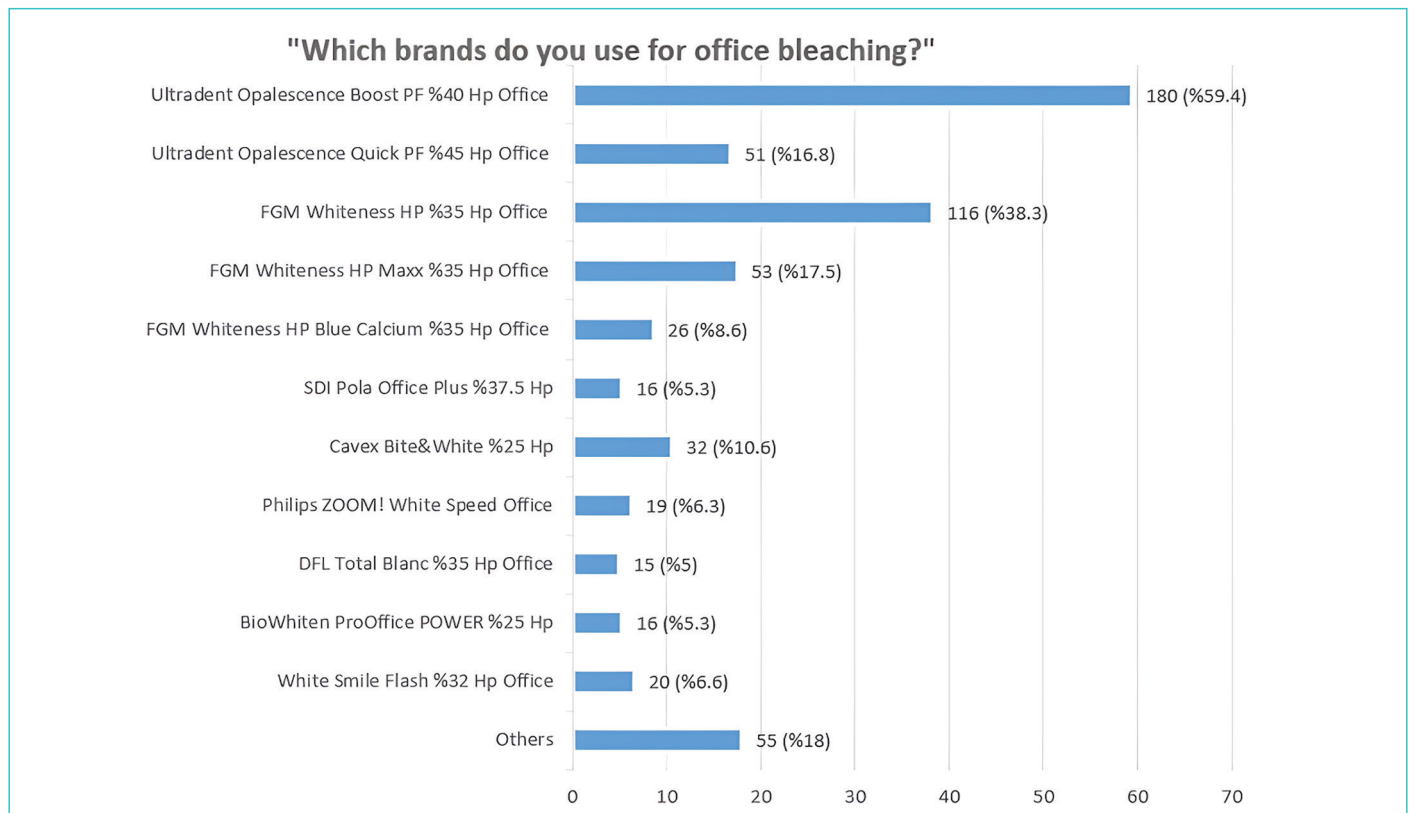


Figure 3. Distribution of commercial brands preferred by surveyed dentists.

between the sector in which dentists worked and their light activation preference ($p < 0.001$). There was a relationship between the sector in which dentists worked and the preference for mixing bleaching gel preference ($p < 0.001$). There was a relationship between the sector in which dentists worked and laser preference ($p = 0.025$). General dentists preferred light activation in bleaching treatment more than specialist dentists ($p = 0.001$) (Table 3).

The answers to the question “At which stage do you perform restoration in case of need?” were compared according to the professional experience, sector, and specialization status of the dentists. The obtained data are presented in Table 4. There was a relationship between the sector in

which dentists worked and the preference for “7 days after bleaching” ($p < 0.001$). There was a relationship between the sector in which dentists worked and the preference for “14 days after bleaching” ($p < 0.001$). There was a relationship between the sector in which dentists worked and the preference for “+14 days after bleaching” ($p < 0.001$). General dentists preferred restorations performed in the same session with bleaching compared with specialist dentists ($p = 0.039$). General dentists preferred the “7 days after bleaching” option as restoration time more than specialist dentists ($p < 0.001$) (Table 4).

“What complaints do you encounter during and after the application?” The answers to the questions were compared according to the dentists’

Table 2. Comparison of the answers to the question “How many office bleaching sessions do you perform?” based on interaction groups of specialty, place of work, and working time

Variables	Single session		p	Two session		p	Three session		p
	Yes, (n %)	No (n %)		Yes, (n %)	No (n %)		Yes, (n %)	No (n %)	
Professional experience									
≤5	68 (25.4%)	200 (74.6%)	0.092	106 (39.6%)	162 (60.4%)	0.460	29 (10.8%)	239 (89.2%)	0.206
>5	48 (19.2%)	202 (80.8%)		91 (36.4%)	159 (63.6%)		19 (7.6%)	231 (92.4%)	
Working institutions									
Public sector	28 (10.8%)	232 (89.2%)	0.001*	66 (25.4%)	194 (74.6%)	0.001*	23 (8.8%)	237 (91.2%)	0.741
Private sector	88 (34.1%)	170 (65.9%)		131 (50.8%)	127 (49.2%)		25 (9.7%)	233 (90.3%)	
Specialization									
General dentist	78 (28.8%)	193 (71.2%)	0.001*	167 (61.6%)	104 (38.4%)	0.865	30 (11.1%)	241 (88.9%)	0.138
Specialist dentist	38 (15.4%)	209 (84.6%)		154 (62.3%)	93 (37.7%)		18 (7.3%)	229 (92.7%)	

(n %): Categorical variables are expressed as frequencies and percentages, respectively.

Table 3. Comparison of the answers to the question “What do you use as an activator during the bleaching process?” according to the interaction groups of specialty, place of work, and working time

Variables	Light device		p	Mix the bleaching gel		p	Short time passed over teeth with LED		p	Laser		p
	Yes, (n %)	No (n %)		Yes, (n %)	No (n %)		Yes, (n %)	No (n %)		Yes, (n %)	No (n %)	
Professional experience												
≤5	114 (42.5%)	154 (57.5%)	0.153	83 (31.0%)	185 (69.0%)	0.801	39 (14.6%)	229 (85.4%)	0.647	18 (6.7%)	250 (93.3%)	0.696
>5	91 (36.4%)	159 (63.6%)		80 (32.0%)	170 (68.0%)		40 (16.0%)	210 (84.0%)		19 (7.6%)	231 (92.4%)	
Working Institutions												
Public sector	55 (21.2%)	205 (78.8%)	0.001*	56 (21.5%)	204 (78.5%)	0.001*	35 (13.5%)	225 (86.5%)	0.255	12 (4.6%)	248 (95.4%)	0.025*
Private sector	150 (58.1%)	108 (41.9%)		107 (41.5%)	151 (58.5%)		44 (17.1%)	214 (82.9%)		25 (9.7%)	233 (90.3%)	
Specialization												
General dentist	125 (46.1%)	146 (53.9%)	0.001*	90 (33.2%)	181 (66.8%)	0.371	36 (13.3%)	235 (86.7%)	0.192	20 (7.4%)	251 (92.6%)	0.826
Specialist dentist	80 (32.4%)	167 (67.6%)		73 (29.6%)	174 (70.4%)		43 (17.4%)	204 (82.6%)		17 (6.9%)	230 (93.1%)	

(n %): Categorical variables are expressed as frequencies and percentages, respectively, LED: Light emitting diode.

Table 4. Comparison of the answers given to the question “If there is a need for restoration, at what stage do you do it?” according to the interaction groups of the field of specialization, place of employment, and working time

Variables	Same session as bleaching		p	Seven days after bleaching		p	Fourteen days after bleaching		p	+Fourteen days after bleaching		p
	Yes, (n %)	No (n %)		Yes, (n %)	No (n %)		Yes, (n %)	No (n %)		Yes, (n %)	No (n %)	
Professional experience												
≤5	23 (8.6%)	245 (91.4%)	0.260	62 (23.1%)	206 (76.9%)	0.149	77 (28.7%)	191 (71.3%)	0.553	32 (11.9%)	236 (88.1%)	0.485
>5	15 (6.0%)	235 (94.0%)		45 (18.0%)	205 (82.0%)		66 (26.4%)	184 (73.6%)		35 (14.0%)	215 (86.0%)	
Working institutions												
Public sector	14 (5.4%)	246 (94.6%)	0.087	28 (10.8%)	232 (89.2%)	0.001*	52 (20.0%)	208 (80.0%)	0.001*	26 (10.0%)	234 (90.0%)	0.046*
Private sector	24 (9.3%)	234 (90.7%)		79 (30.6%)	179 (69.4%)		91 (35.3%)	167 (64.7%)		41 (15.9%)	217 (84.1%)	
Specialization												
General dentist	26 (9.6%)	245 (90.4%)	0.039*	75 (27.7%)	196 (72.3%)	0.001*	72 (26.6%)	199 (73.4%)	0.580	31 (11.4%)	240 (88.6%)	0.288
Specialist dentist	12 (4.9%)	235 (95.1%)		32 (13.0%)	215 (87.0%)		71 (28.7%)	176 (71.3%)		36 (14.6%)	211 (85.4%)	

(n %): Categorical variables are expressed as frequencies and percentages, respectively.

professional experience, the sector in which they work, and their specialization. The obtained data are presented in Table 5. There was a relationship between the professional experience of dentists and TMJ disorder ($p=0.038$). Dentists working in the private sector were more likely to experience pain, sensitivity, and irritation of soft tissues after

bleaching than those working in the public sector ($p<0.05$). There was a relationship between the specialty status of dentists and sensitivity ($p=0.016$) (Table 5).

Table 5. Comparison of the answers to the question “Which complaints do you encounter during and at the end of the practice?” according to the interaction groups of field of specialization, place of employment and working time

Variables	Pain		p	Irritation of soft tissues		p	Sensitivity		p	TMJ disorder		p
	Yes, (n %)	No (n %)		Yes, (n %)	No (n %)		Yes, (n %)	No (n %)		Yes, (n %)	No (n %)	
Professional experience												
≤5	45 (16.8%)	223 (83.2%)	0.901	78 (29.1%)	190 (70.9%)	0.939	152 (56.7%)	116 (43.3%)	0.071	13 (4.9%)	255 (95.1%)	0.038*
>5	43 (17.2%)	207 (82.8%)		72 (28.8%)	178 (71.2%)		122 (48.8%)	128 (51.2%)		4 (1.6%)	246 (98.4%)	
Working institutions												
Public sector	33 (12.7%)	227 (87.3%)	0.009*	59 (22.7%)	201 (77.3%)	0.002*	90 (34.65.9)	170 (65.4%)	0.001*	7 (2.7%)	253 (97.3%)	0.450
Private sector	55 (21.3%)	203 (78.7%)		91 (35.3%)	167 (64.7%)		184 (71.3%)	74 (28.7%)		10 (3.9%)	248 (96.1%)	
Specialization												
General dentist	44 (16.2%)	227 (83.8%)	0.633	78 (28.8%)	193 (71.2%)	0.927	157 (57.9%)	114 (42.1%)	0.016*	11 (4.1%)	260 (95.9%)	0.298
Specialist dentist	44 (17.8%)	203 (82.2%)		72 (29.1%)	175 (70.9%)		117 (47.4%)	130 (52.6%)		6 (2.4%)	241 (97.6%)	

(n %): Categorical variables are expressed as frequencies and percentages, respectively, TMJ: Temporomandibular joint.

DISCUSSION

In recent years, the number of people visiting dentists with the desire of having whiter teeth has been increasing rapidly, parallel to the increase in modernity and socialization. When indications and contraindications, materials used, application methods, and control and follow-up periods are considered together, bleaching should be considered as a form of treatment.

In a survey conducted among university students; 16.1% of the students had had bleaching at least once in their lives and 74.4% were wanting to have vital teeth bleaching.¹⁵ In a survey among orthodontists, it was reported that 99.2% of patients undergoing orthodontic treatment were requesting bleaching.¹⁶ In another survey searching the prevalence of the desire for teeth bleaching, 85% of 536 participants answered “yes” to the question asking if they want to whiten their teeth. The same study also reported that the number of people seeking vital bleaching had increased 2.3 times in one year.¹⁷ As the interest in white teeth continues to grow, it is necessary to support this issue with new studies to improve the working principles of dentists and to protect patient comfort and health.

According to the results of the present study, most of the participating dentists applied vital bleaching treatment. According to the results obtained, general dentists applied bleaching treatment more frequently than specialists, and dentists with equal or less than 5 years of experience applied bleaching treatment more frequently than experienced dentists. In Türkiye, vital bleaching treatment is performed mostly in the private and secondary sectors. In a survey conducted in Pakistan, which reported different results from the present study, among dentists who perform vital bleaching, those working in the public sector perform more vital bleaching than those working in the private sector, and dentists with more clinical experience perform more vital bleaching than those dentists with equal or less than 5 years of experience.¹⁸

In the present study, in which dentists were grouped according to their specialty, institution, and professional experience, office-type vital bleaching was the most preferred method in all groups. The second-preferred method in all groups was the combined office and home bleaching, while home-type vital bleaching was preferred the third. According to the results of a survey conducted among Guatemalan dentists, dentists working in the private sector prefer office bleaching, whereas those working in the public sector prefer home bleaching.¹⁹ According to a survey conducted among Palestinian dentists, dentists with equal or less than 5 years of experience

prefer home bleaching, while dentists with more than 5 years of experience prefer office bleaching.²⁰ In a study conducted in Pakistan, dentist with 10-20 years of experience preferred the office-type with a statistically significant result.¹⁸ As a reason for this, other researchers think that decision-making ability increases with experience and that the tendency to bleaching method applied in the office increases as a result of increased self-confidence with the effect of the trainings received over time.²⁰

The microabrasion preference rates of the dentists who participated in this study were lower than those of the other methods. In a survey study among orthodontists, it was reported that most of them (78%) applied the microabrasion technique after orthodontic treatment for the removal of discoloration and white spot lesions.²¹ The fact that the mentioned study was conducted only among orthodontists and the high probability of the need for microabrasion as a result of orthodontic treatments explains the different results obtained from the present study applied to all specialties.

According to the results of the present study, the most preferred office bleaching commercial product was “Ultradent Opalescence Boost PF 40% HP”, followed by “FGM Whiteness HP 35%”. These products are frequently preferred in clinical and in vitro studies.^{1,22,23}

The number of bleaching treatment sessions is usually indicated in the manufacturer’s instructions for use.²⁴ Nevertheless, the number of sessions may vary depending on the conditions deemed appropriate by the dentist and other patient and patient-related factors. In the present study, when asked how many sessions of vital bleaching treatment they usually perform, dentists in Türkiye responded “2 sessions” most frequently in all groups. In addition, general dentists and less experienced dentists generally preferred single-session applications over the other groups. According to the results of a telephone survey, 85% of dentists reported that a single session of vital bleaching treatment was performed.²⁵ According to the literature, 2 or 3 sessions are necessary to achieve and maintain effective office bleaching.²⁶

In office bleaching treatment, high-concentration hydrogen peroxide is applied without activation or activation by methods such as heat, light, and laser. There are controversial results in the literature regarding the effectiveness and risk-benefit ratio of activation methods. Some studies claim that light activation improves bleaching efficacy in terms of color change, while others suggest that there is no difference between light-activated bleaching and conventional bleaching.^{10,27} A recent study reported that there was no difference in tooth color change and

sensitivity increase in bleaching with and without the use of an LED/laser hybrid device. It is thought that no sensitivity difference occurred in this study due to the anti-inflammatory and analgesic effect of hybrid light.¹⁰ In another study, it was stated that there was no difference in the effectiveness of light or non-light treatment in bleaching with high concentrations of hydrogen peroxide.²⁷

According to the literature, contradictory results in the studies are due to the fact that variables such as the wavelength of the light, the type of light device, the duration of use, and the concentration of the agent cannot be fixed.²⁸ Today, as a result of the support of companies and the perception created, the bleaching process using light devices is becoming widespread in clinics in direct proportion to the amount of demand of patients. While the necessity of using light devices in bleaching treatment is a matter of debate, it has been supported by clinical and *in vitro* studies.

In the present study, the methods used for activation in bleaching treatment were questioned, and it was determined that “Light device” was preferred with the highest rate (67.3%) in all groups. Moreover, general dentists preferred light activation to specialists. Dentists working in the private sector prefer light activation over those working in the public sector. According to a survey study investigating the light device preferences of dentists in bleaching; 49.3% of dentists were using ultraviolet (UV) devices, 10.8% were using blue LED and laser, and 39.9% were preferring treatment without light activation.²⁵ According to the results of another survey, 58.6% of dentists were preferring light activation, while 41.4% were not using light devices for vital bleaching.²⁰ In the results of another study, 44.8% were using LED devices, 15.2% were using laser, and 11.7% were using halogen light sources, while 28.3% were not using light activation.²⁹

According to the literature, residual peroxide that persists after vital bleaching interferes with adhesive polymerization and adversely affects restoration health. The restoration should be done 2 or 3 weeks after the bleaching procedure.³⁰ An *in vitro* study with six different waiting times after bleaching showed that there was no difference in the enamel bond strength of the composite restoration between the times.³¹ In a recent study, it was shown that adhesion increased with the antioxidant applied immediately after bleaching.¹³ Another study compared the bonding of resin composites applied to enamel treated with 10% ascorbic acid after vital bleaching with resin composites applied to enamel that had never been bleached and reported that there was no difference.³² In another clinical study, a 1-year follow-up of the restoration on a lateral tooth treated with sodium ascorbate for 1 hour after bleaching showed high clinical success.³³

In the present study, we questioned on which day the dentists would restore the teeth if restoration was needed after vital teeth bleaching treatment. In all groups, the answer “after 14 days” was mostly given without any significant difference. It was also found that general dentists gave the answers “the same session as bleaching” and “after 7 days” more often than specialist dentists. In another survey of Romanian dentists, which also asked about the use of antioxidants, 88.8% answered “after 14 days”, 4.8% answered “immediately without antioxidants” and 3.4% answered “immediately with antioxidants” when asked how long it would take to restore teeth after vital bleaching.²⁹

In the present study, when dentists were asked which complications they encountered the most during and at the end of vital teeth bleaching

application, “sensitivity” was the most common answer (90.1%) and “soft tissue irritations” was the second most common answer. In the present study, we found that dentists working in the private sector encountered pain, sensitivity, and soft tissue irritation at a higher rate than those working in the public sector. In addition, general dentists received more sensitivity feedback from their patients than specialist dentists. According to another survey with similar results, 75.7% of dentists were experiencing sensitivity and 29.7% were experiencing gingival burns.²⁵ In another study, sensitivity and soft tissue inflammation were the most common side effects reported by dentists, with an increase in sensitivity with the use of UV light.²⁹ According to a Nigerian survey study on hypersensitivity, 80.3% of dentists identified teeth bleaching treatment as a predisposing factor for sensitivity.³⁴

Study Limitation

This survey was completed by 518 dentists. Although the study included more participants, the sample size was limited to 518 due to dentists who did not prefer to complete the questionnaire. The fact that the study was completed with fewer participants than expected can be considered a limitation of the study.

CONCLUSION

According to the results of the study, differences were found between the methods for vital bleaching treatment and materials preferred by dentists in Türkiye according to their specialization status, sector of employment, and interaction groups in professional experience. Among the vital bleaching methods, office bleaching was the most preferred method in all groups. As the professional experience of dentists increases, their preference for home bleaching and combined office and home bleaching also increases. Two-session in-office vital bleaching was the most preferred option among all dentist groups. In all groups, bleaching with light activation was the most preferred option. Dentists usually apply restorations 14 days after vital bleaching. The most common complication encountered by dentists during vital teeth bleaching treatment was sensitivity, and the second most common complication was irritation of soft tissues. Dentists working in the private sector were more likely to experience pain, sensitivity, and soft tissue irritation than those working in the public sector. It is thought that it would be useful to support this study with new studies with larger sample sizes and multicenter studies.

MAIN POINTS

- In-office bleaching was the most preferred vital bleaching method in all groups.
- Dentists working in the private sector preferred light activation during vital tooth bleaching more than those working in the public sector and general practitioners more than specialists.
- Most dentists found a total of 2 sessions sufficient for office-type vital bleaching.
- All dentists identified sensitivity as the most common complication of vital tooth bleaching.

ETHICS

Ethics Committee Approval: The study protocol was approved by Eskişehir Osmangazi University Non-Interventional Clinical Research Ethics Committee (approval number: 49, date: 15.02.2022).

Informed Consent: It was obtained.

Footnotes

Authorship Contributions

Concept: M.B.T., B.C.Y., H.T., Design: M.B.T., B.C.Y., Data Collection and/or Processing: M.B.T., B.C.Y., Analysis and/or Interpretation: M.B.T., B.C.Y., Ö.Ç., Literature Search: M.B.T., B.C.Y., H.T., Writing: M.B.T., B.C.Y., Ö.Ç.

DISCLOSURES

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

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

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