

Perception of the effects of bleaching on restorative material among healthcare specialists

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Abstract

Aim and background: The cosmetic industry, advertisement companies, and the media emphasize having a pleasing physical appearance. As a result, many people are concerned about the aesthetics of their smile and teeth color and use bleaching methods to enhance them. This study, therefore, aims to assess healthcare specialists' knowledge about the effects of bleaching on restorative material.

Methodology: A questionnaire-based study was conducted among 624 participants from different dental fields (students, interns, practitioners, and specialists).

Results: The results showed that 157 (25.2%) participants agreed that bleaching affects restorative materials and that restoration can be performed after one week of bleaching.

Conclusion: Based on the results, it can be concluded that bleaching treatments do not damage restoration.

Keywords: Cosmetics industry, Aesthetic, Restoration, Bleaching

Introduction

Cosmetic dentistry is an integral part of dental treatment, and demand for it is increasing daily.¹ The most commonly used restorative material is a composite resin, which provides durability while meeting clients' aesthetic needs.² Despite improvements in the properties of restorative materials, some issues remain with their use, with one of the main concerns being the change in color.^{3,4} To ensure client satisfaction by preserving aesthetic appearance, color stability is a critical property of restoration material.⁵

For discolored or darkened teeth, bleaching is considered the most effective treatment because it prevents the loss of tissues.^{6,7} Home bleaching with a mouth guard and gel under the supervision of a dentist is the most commonly used method.⁸ In young people, a protocol for this technique was published in 1994.⁹ However, highly concentrated hydrogen peroxide in-office bleaching is a suitable alternative to home bleaching, particularly for severe discoloration or if an immediate result after a short application time is required.^{10,11,12}

There are many causes of restorative material discoloration, including extrinsic and intrinsic factors.^{13,14} Some reports have indicated the softening of the material and the appearance of small cracks,^{15,16} although other studies have observed limited effects on restoration by bleaching.^{1,17,18} Khoroshi et al.¹⁹

reported that light bleaching treatments increased the dentin microleakage of restoration when applied immediately after the restoration but not when bleaching was applied 1–3 weeks later. Longer bleaching time also increased restoration microleakage.²⁰ Furthermore, other evidence indicates that bleaching treatment is effective in decreasing microleakage.²¹

The main aim of this study was to evaluate dental healthcare specialists' perceptions of the effect of bleaching on restoration material.

Material And Methods

Study sample and design: The present cross-sectional study was based on a questionnaire completed by 624 dental healthcare specialists (dental students, interns, practitioners, and specialists) in March 2022. The survey was conducted by a simple random sampling method among dental healthcare specialties from different regions of the country. The link to the Google form questionnaire was shared via social media.

Collection of data: The data were collected and transferred to an Excel sheet for further analysis.

Statistical analysis: The dataset was analyzed using SPSS 27.0 to determine the frequency of each response among the participants.

Results

This study comprised 624 participants, including 464 (74.4%) males and 160 (25.6%) females. Among these, 221(35.4%) were dental students, 194 (31.1%) were dental interns, 134(21.5%) were general practitioners, and 75(12%) were specialists. Most were aged 20–25 years. The social and demographic characteristics of the participants are shown in Table 1 and Figure 1.

Most of the participants (42), including 3(0.5%) dental students, 4(0.6%) interns, 16(2.6%) practitioners, and 19(3.0%) specialists agreed that it took between six months and a year for teeth discoloration. Among the participants, in-office bleaching was the most commonly used technique and was preferred by 118(18.9%) dental students,

123(19.7%) interns, 88(14.1%) practitioners, and 49(7.9%) specialists. Carbamide peroxide (at a concentration of 18%) was the preferred option for home bleaching, selected by 258 participants (41.3%), while 30% hydrogen peroxide was preferred by 215 participants (34.5%) for office bleaching. A total of 157 (25.2%) participants—60(9.6%) students, 48(7.7%) interns, 31(5.0%) practitioners, and 18(2.9%) specialists—agreed that bleaching caused damage to fillings or restorations. Most participants from each specialty—100 (16.0%) students, 89(14.3%) interns, 76(12.2%) practitioners, and 39(6.3%) specialists—agreed that composite restoration can be performed one week after bleaching. This response by the participants showed statistical significance at the $P < 0.01$ value (Table 2).



Table 1: Demographic Details of Participants

	n	Percentage
Age		
20-25	253	40.5
25-30	195	31.3
30-35	102	16.3
35-more	74	11.9
Total	624	100.0
Gender		
Male	464	74.4
Female	160	25.6
Total	624	100.0
Current level		
Students	221	35.4
Interns	194	31.1
Practitioners	134	21.5
Specialists	75	12.0
Total	624	100.0
Country Region		
Southern	85	13.6
Northern	173	27.7
Western	97	15.5
Eastern	77	12.3
Middle	71	11.4
Not answered	121	19.4
Total	624	100.0

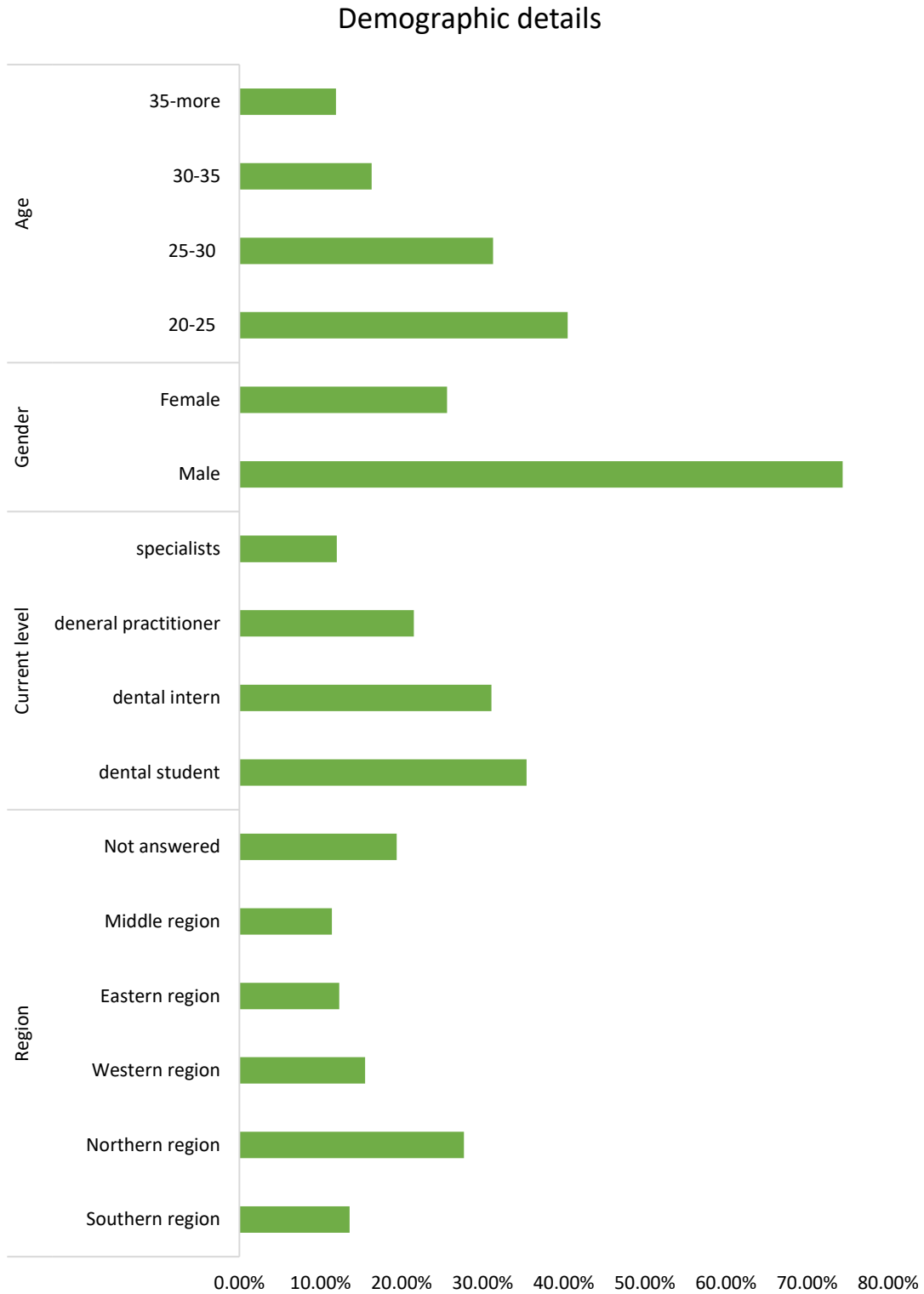


Fig1: Demographic data

Table. 2: Correlation between specialty and practice of bleaching

Response		Specialty				Total	Chi-square	p-value
		Student	Intern	Practitioner	Specialist			
Use of bleaching	Didn't use bleaching	121 19.4%	99 15.9%	44 7.1%	15 2.4%	279 44.7%	103.983	0.000
	0	7 1.1%	8 1.3%	3 0.5%	4 0.6%	22 3.5%		
	1	62 9.9%	53 8.5%	39 6.3%	12 1.9%	166 26.6%		
	2	18 2.9%	22 3.5%	25 4.0%	12 1.9%	77 12.3%		
	>2	13 2.1%	12 1.9%	23 3.7%	32 5.1%	80 12.8%		
Time taken to discolor the teeth again	Not responded	208 33.3%	182 29.2%	111 17.8%	43 6.9%	544 87.2%	94.770	0.000
	6 months	8 1.3%	5 0.8%	3 0.5%	5 0.8%	21 3.4%		
	6 months to 1 year	3 0.5%	4 0.6%	16 2.6%	19 3.0%	42 6.7%		
	Year to 2 years	1 0.2%	2 0.3%	3 0.5%	6 1.0%	12 1.9%		
	>2 years	1 0.2%	1 0.2%	1 0.2%	2 0.3%	5 0.8%		
Preferred bleaching method	Home bleaching	64 10.3%	36 5.8%	20 3.2%	14 2.2%	134 21.5%	18.820	0.027
	In office bleaching	118 18.9%	123 19.7%	88 14.1%	49 7.9%	378 60.6%		
	Over the counter bleaching	21 3.4%	26 4.2%	13 2.1%	5 0.8%	65 10.4%		
	Combined	18 2.9%	9 1.4%	13 2.1%	7 1.1%	47 7.5%		
Preferred concentration of material for home bleaching	Carbamide peroxide 16%	83 13.3%	53 8.5%	31 5.0%	15 2.4%	182 29.2%	24.124	0.004
	Carbamide peroxide 18%	78 12.5%	96 15.4%	55 8.8%	29 4.6%	258 41.3%		
	Carbamide peroxide 20%	41 6.6%	33 5.3%	35 5.6%	20 3.2%	129 20.7%		
	Carbamide peroxide 22%	19 3.0%	12 1.9%	13 2.1%	11 1.8%	55 8.8%		
Preferred concentration of material for office bleaching	Hydrogen peroxide 20%	70 11.2%	59 9.5%	28 4.5%	13 2.1%	170 27.2%	21.313	0.011
	Hydrogen peroxide 30%	76 12.2%	73 11.7%	45 7.2%	21 3.4%	215 34.5%		

						%		
	Hydrogenperoxide 35%	56 9.0%	45 7.2%	50 8.0%	29 4.6%	180 28.8 %		
	Hydrogenperoxide 40%	19 3.0%	17 2.7%	11 1.8%	12 1.9%	59 9.5%		
Is bleaching material damaging for fillings or restorations?	Yes	60 9.6%	48 7.7%	31 5.0%	18 2.9%	157 25.2 %	0.828	0.843
	No	161 25.8%	146 23.4%	103 16.5%	57 9.1%	467 74.8 %		
When restoration can be done after bleaching?	Immediately	56 9.0%	45 7.2%	21 3.4%	15 2.4%	137 22.0 %	13.596	0.137
	One day later	39 6.3%	42 6.7%	23 3.7%	8 1.3%	112 17.9 %		
	After a week	100 16.0%	89 14.3%	76 12.2%	39 6.3%	304 48.7 %		
	After 1 month	26 4.2%	18 2.9%	14 2.2%	13 2.1%	71 11.4 %		

Discussion

In recent decades, much attention has been paid to bleaching treatment along with restoration. Bleaching may have various effects on restoration materials.²² However, a large number of participants in our study (467, 74.8%) believed that bleaching does not have damaging effects on restoration. The materials used for bleaching treatment can pass through the pores and edges of restorations if not well-flooded. Hence, bleaching agents can cause microleakage in the restoration material.¹⁵ The porosity of restorative material may be increased by a higher concentration of bleaching material and a longer bleaching time.²³ In this study, only 55(8.8%) and 59(9.5%) participants preferred more concentrated solutions of 22% carbamide peroxide and 40% hydrogen peroxide for bleaching, respectively, as more concentrated agents may cause more damage. In investigating the effects of office and home bleaching materials on restoration, Klein et al. found that teeth untreated by bleaching had a low incidence of microleakage.²⁴ The difference between the results of Klein et al. and this current study might be due to the type of restoration and bleaching materials used, tooth type, cavity types, types of adhesive, bleaching time, and material concentration.

Conclusion

Healthcare specialists were asked about the effect of bleaching on restoration material. Most participants were aware of the effects of time and concentration of bleaching material, but a lack of knowledge was found relating to its effects on restorations or fillings. It can be concluded from the participants' responses that restorations cannot be damaged with the bleaching treatment.

References

1. Asdagh S, Daneshpooy M, Rahbar M, Dabaghi-Tabriz F, Bahramian A, Esmailzadeh M. Effect of home bleaching on the color matching of composite resin restorations, *Pesquisa Brasileira em Odontopediatria e Clinica Integrada*, 2018; 18: p. 4122.
2. Dane shkazemi A, Davari A, Maleki S. An invitro evaluation of the effect of 10% carbamide Peroxide on microleakage of two types of microfilmed and hybrid resin composites. *Journal of Islamic Dental Association of Iran*, 2007; 19: 14-21.
3. Hickel R, Heidemann D, Staehle HJ, Minnig P, Wilson NH. Direct composite restorations: Extended use in anterior and posterior situations. *Clin Oral Investig*. 2004;8:43-44.

4. Ertaş E, Guler AU, Yucel AC, Koprulu H, Guler E. Color stability of resin composites after immersion in different drinks. *Dental Materials Journal*. 2006;25:371-376.
5. Assaf C, Abou Samra PH, Nahas P. Discoloration of resin composites induced by coffee and tomato sauce and subjected to surface polishing: An In Vitro Study. *Med Sci Monit Basic Res*. 2020; 26: 923279.
6. Ji-Hye L, Dare-Gon K, Chan-Jin P, Lei-Ra C. Minimally invasive treatment for esthetic enhancement of white spot lesion in adjacent tooth. *J Adv Prosthodont* 2013;5:359-363.
7. Martin J, Fernandez E, Bahamondes V, Werner A, Elphick K, Oliveira O, et al. Dentin hypersensitivity after teeth bleaching with in-office systems. Randomized clinical trial. *Am J Dent* 2013;26:10-14.
8. Bona AD, Demarco FF, Meireles SS, Santos IS. A double-blind randomized controlled clinical trial of 10 percent versus 16 percent carbamide peroxide tooth-bleaching agents. *JADA* 2009;140:1109-1117.
9. Croll TP. Tooth bleaching for children and teens: A protocol. *Quintessence Int* 1994;25:811-817.
10. Llambes G, Llana C, Amengual J, Forner L. In vitro evaluation of the efficacy of two bleaching procedures. *Med Oral Patol Oral y Cir Bucal* 2011;16:845-851.
11. Machado LS, Rocha EP, Santos PH, Briso ALF, Sundefeld MLMM, Sundefeld RH. Clinical trial evaluating color change and tooth sensitivity throughout and following in-office bleaching. *Int J Periodontics Restorative Dent* 2013;33:208-215.
12. D'Arce MBF, Lima DANL, Aguiar FHB, Bertoldo CES, Ambrosano GMB, Lovadino JR. Effectiveness of dental bleaching in depth after using different bleaching agents. *J Clin Exp Dent* 2013;5:e100-e107.
13. Ashok NG, Jayalakshmi S. Factors that influence the color stability of composite restorations. *Int J Orofac Biol*. 2017;1:1-3.
14. Yu H, Li Q, Attin T, Wang Y. Protective effect of resin coating on the microleakage of class V restorations following treatment with carbamide peroxide in vitro, *Operative Dentistry*. 2010; 35: 634-640.
15. Hashemikamangar SS, Ghavam M, Mahinfar N, Kharazi Fard MJ. Effect of 30% hydrogen peroxide on marginal integrity of silorane-based versus methacrylate based composite restorations, *Journal of Dentistry (Tehran, Iran)*. 2014; 11: 545-553.
16. Sharafeddin F, Zare S, Javnmardi Z. Effect of home bleaching on microleakage of fiber-reinforced and particle-filled composite resins. *Journal of Dental Research, Dental Clinics, Dental Prospects*. 2013; 7: no. 211-217.
17. N. Sartori, S. M. Junior, A. Meyer Filho, and G. M. Arcari, Effect of dental bleaching on the microleakage of class V composite restorations, *Revista Odonto Ci`encia*, vol. 24, no. 3, pp. 279-282, 2009.
18. White DJ, Duschner H, Pioch T. Effect of bleaching treatments on microleakage of class I restorations, *The Journal of Clinical Dentistry*. 2008; 19: 33-36.
19. Barkhordar RA, Kempler D, and Plesh O. Effect of nonvital tooth bleaching on microleakage of resin composite restorations, *Quintessence international (Berlin, Germany:1985)*. 1997; 28: 341-344.
20. Ellias E, Sajjan G. Effect of bleaching on microleakage of resin composite restorations in non-vital teeth. *Endodontology*, 2002; 14: 9-13.
21. Jacob AS, Kumar ND. Effect of pre and post-operative bleaching on microleakage of amalgam and composite restoration using 10% carbamide peroxide-an invitro study. *Journal of Conservative Dentistry*.2007;10: 33-37.
22. Sever EK, Simenc N, Rakic M, Skenderovic H, Sever I, Tarle Z. Effects of bleaching agent on physical and aesthetic properties of restorative materials. *Dental Materials Journal*. 2016; 35: 788-795.
23. Rotstein I, Lehr Z, Gedalia I. Effect of bleaching agents on inorganic components of human dentin and cementum. *Journal of Endodontics*.1992; 18: 290-293.
24. Klein Jr CA, da Silva D, Reston EG, Borghetti DL, Zimmer R. Effect of at-home and in-office bleaching on marginal microleakage in composite resin restorations using two adhesive systems. *The Journal of Contemporary Dental Practice*. 2018; 19: 248-252.