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International Journal of Current Research
Vol. 9, Issue, 02, pp.46800-46803, February, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

EVALUATION OF THE EFFECT OF DIFFERENT BLEACHING AGENTS ON COMPOSITE IN VITRO STUDY

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ARTICLE INFO

Article History:
Received 24th November, 2016
Received in revised form
17th December, 2016
Accepted 02nd January, 2017
Published online 28th February, 2017

Key words:

Tooth whitening,
Bleaching,
In office,
Hydrogen peroxide,
Aesthetics.

ABSTRACT

Aim: To evaluate the effect of bleaching products on the surface of composite restorative material
Objective: To understand the effect of different bleaching products acting on the surface of tooth colored composite restoration before and after staining in various drinks
Background: Tooth coloured restorations are composite restorations which are applied on the prepared cavity and hardened with a special light, which ultimately bonds the material to the tooth to restore or improve the persons smile. Various beverages such as tea, coffee, soft drinks, wine etc. can affect the colour and texture of the composite restoration in various degrees depending on their composition. Bleaching agents such as hydrogen peroxide and carbamide peroxide, the two most popular bleaching products, can change the physical properties of dental restorations.
Purpose: As dental whitening has become more accessible, many patients select this treatment for esthetic reasons. In most cases, they want whiter teeth. Consumption of various beverages such as soft drinks, coffee, tea etc. is also increasing among patients of all ages. Because of the popularity and convenience of bleaching and the addition of new bleaching products every year, it is important to study the effects of these products on teeth and dental restorative materials.
Materials and Methods: 27 specimens (5mm x 2 mm) of composite were prepared, The specimen were divided into 3 groups of 12, 12, and 3 each. These groups were again divided into 4 subgroups of 3 specimen each (n=3) and stained for 9 hours in tea, coffee, soft drinks and wine respectively. The specimen were then subjected to their specific bleaching agents, Pola Office and Colgate optic White Blaching Kit. Colorimetric measurements were performed before staining, after staining and after bleaching. Analysis of variance and nonparametric analysis were used to analyse data.
Results: After staining, it was observed that tea stained the composites the most. After bleaching it was observed that the Pola Office Bleaching kit was more effective in bleaching than the Colgate Optic white bleaching kit.
Conclusion: It can be concluded that in office bleaching removes surface stains from composite restorations more than when compared to the home use bleaching kit. It is advised that the in office bleaching agents be used for patients with stains on composite restorations, providing better whitening effect.

Citation: Radhika Murali and Dr. Manish Ranjan, 2017. "Evaluation of the effect of different bleaching agents on composite in vitro study", *International Journal of Current Research*, 09, (02), 46800-46803.

INTRODUCTION

Composite resins have been widely used since their introduction because of their excellent esthetic properties. However a major disadvantage is their discolouration after prolonged exposure to the oral environment. Unacceptable colour is a primary reason for replacement of composite restorations. (Kroeze *et al*., 1990; Wilson *et al*., 1997) Discoloration of tooth-coloured resin based materials may be caused by intrinsic and extrinsic factors. Intrinsic factors involve discoloration of the resin material itself, and extrinsic factors such as adsorption or absorption of stains may cause discoloration. (Martin *et al*., 2003; Braden and Pearson, 1981; Fan *et al*., 1985) Since their introduction, the use of bleaching agents has become increasingly popular for whitening stained teeth. (Ferracane, 1994; Yap and Wee, 2002) As these products contact tooth structures for extended periods of time, they may come into contact with dental materials. As discoloration of resin based composites is a common problem, studies also investigated the effect of bleaching agents on tooth colored materials. (Soderholm *et al*., 1984; Yap *et al*., 2000; Iazzetti *et al*., 2000)

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MATERIALS AND METHODS

Preparation of Specimen

DenFil Composite of shade B2 was used for this study. 27 specimen were prepared out of this composite, 9mm in diameter and 2.5mm in depth, prepared in plastic moulds. The specimen were cured using LED light for 20 seconds on both sides. Afterwards all specimens were stored in distilled water for 24 hours at 37°C to ensure complete polymerization. The top surface of all specimen were then polished using fine and superfine polishing disks with slow speed handpiece.

Color Testing

Color of the specimen was measured using a colorimeter against a standard at baseline, afterstaining and after bleaching. Each specimen was tested three times and a mean value was recorded.

Staining Process

The 27 specimen were separated into 3 groups of 3, 12 and 12 each. The first group acted as a control whereas the second and third were subjected to staining and bleaching. The second and third groups were again subdivided into 4 groups each (n=3) and were stained in tea, coffee, soft drinks and wine respectively for 9 hours at room temperature. After staining, the specimens were gently rinsed with distilled water, air dried and stored in distilled water at 37°C.

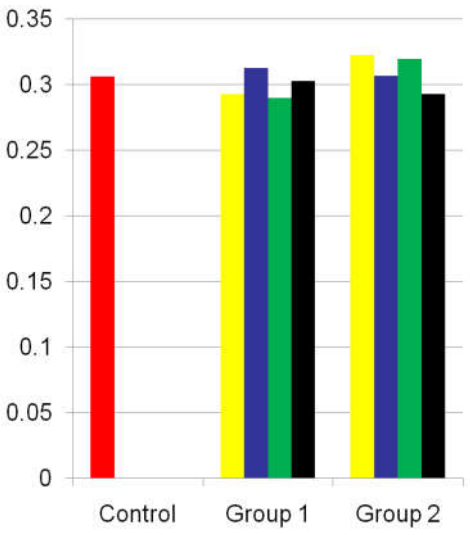
Bleaching Process

The bleaching agents used in this study were an in office bleaching agent (Pola Office, 37% Hydrogen Peroxide) and a Home Use Bleaching kit (Colgate Optic White Bleaching Kit, 7% Hydrogen Peroxide). Specimen of the second group were subjected to the in office bleaching agent whereas specimen of the third group were subjected to the home use bleaching kit. The in office bleaching material was painted in the surface of the specimen and the light cured according to the manufacturer's instruction. The home use bleaching material was applied in a plastic well and the specimen were immersed in it for 9 hours. After bleaching the specimen were rinsed with tap water for 1 minute to remove the bleaching agents, blotted dry, and stored in distilled water at 37°C. One way and two way analysis of Variance (ANOVA) tests were used to analyse the data. Paired t test and independent t test were also used. Statistical Software was used to perform the analysis.

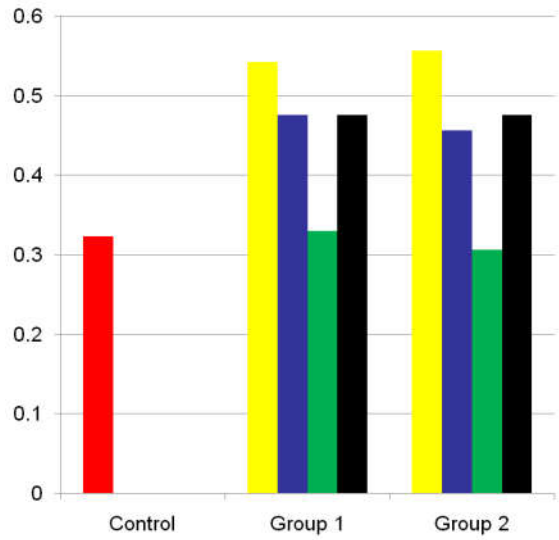
RESULTS

Mean values for intervals of baseline, bleaching and staining are seen in Table I. After staining, it was observed that all the specimen showed significant discoloration, with tea staining the composite specimen the most. Overall, the control group had the least color change in the 3 intervals.

Pre-immersion readings



Post Immersion Readings



Post Bleach Readings

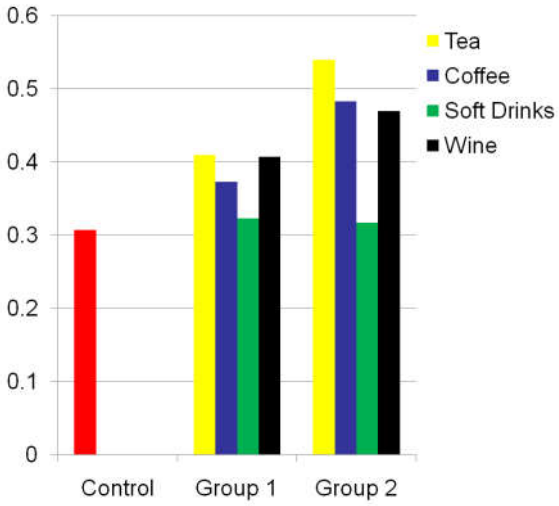


Table I: Observed Average Readings

GROUP = In Office Bleaching Agent

Report(a)

Sub-group		Pre immersion readings	Post immersion readings	post bleach readings
Control	Mean	.3067	.3233	.307
	N	3	3	3
	Std. Deviation	.01528	.01528	.0058
Tea	Mean	.2933	.5433	.410
	N	3	3	3
	Std. Deviation	.05132	.02309	.0173
Coffee	Mean	.3133	.4767	.373
	N	3	3	3
	Std. Deviation	.01528	.00577	.0208
Soft Drink	Mean	.2900	.3300	.323
	N	3	3	3
	Std. Deviation	.01732	.01000	.0058
Wine	Mean	.3033	.4767	.407
	N	3	3	3
	Std. Deviation	.02887	.01528	.0153
Total	Mean	.3013	.4300	.364
	N	15	15	15
	Std. Deviation	.02615	.09181	.0455

a GROUP = Group 1

GROUP = Home Use bleaching Agent

Report(a)

Sub-group		Pre immersion readings	Post immersion readings	post bleach readings
Control	Mean	.3067	.3233	.307
	N	3	3	3
	Std. Deviation	.01528	.01528	.0058
Tea	Mean	.3233	.5567	.540
	N	3	3	3
	Std. Deviation	.04041	.02309	.0265
Coffee	Mean	.3067	.4567	.483
	N	3	3	3
	Std. Deviation	.01528	.04041	.0058
Soft Drink	Mean	.3200	.3067	.317
	N	3	3	3
	Std. Deviation	.01000	.00577	.0058
Wine	Mean	.2933	.4767	.470
	N	3	3	3
	Std. Deviation	.01528	.01155	.0100
Total	Mean	.3100	.4240	.423
	N	15	15	15
	Std. Deviation	.02171	.10041	.0982

a GROUP = Group 2

Table II: One way ANOVA

GROUP = In Office Bleaching Agent

		Sum of Squares	df	Mean Square	F	Sig.
Pre immersion readings	Between Groups	.001	4	.000	.327	.854
	Within Groups	.008	10	.001		
	Total	.010	14			
Post immersion readings	Between Groups	.116	4	.029	127.647	.000
	Within Groups	.002	10	.000		
	Total	.118	14			
post bleach readings	Between Groups	.027	4	.007	32.532	.000
	Within Groups	.002	10	.000		
	Total	.029	14			

GROUP = Home use bleaching agent

		Sum of Squares	df	Mean Square	F	Sig.
Pre immersion readings	Between Groups	.002	4	.000	.890	.504
	Within Groups	.005	10	.000		
	Total	.007	14			
Post immersion readings	Between Groups	.136	4	.034	66.247	.000
	Within Groups	.005	10	.001		
	Total	.141	14			
post bleach readings	Between Groups	.133	4	.033	184.907	.000
	Within Groups	.002	10	.000		
	Total	.135	14			

The data for the 1 way ANOVA performed, as seen in table II, was used to analyze the color change after bleaching. The results of the statistical analysis show that staining with tea had a significant influence on the color change for the specimen. These were significantly different from the control group. For the color change between bleaching and baseline, the staining solutions, bleaching agents and interaction between the two variables all had significant influence. Considering the specimen subjected to the home bleaching agents, there was not much significant change in the post immersion and post bleach readings as compared to the specimen of the in office bleaching agents. The data shows that the in office agent has a better bleaching effect and removal of stains, when compared to the home use bleaching agent.

DISCUSSION

After staining, the specimen did show a perceptible color change. Low pH and alcohol may affect the surface integrity of composite resins and cause staining. These results are similar to those reporterd by Stober *et al*. (2001). The effect of attaining solutions on color changes of composite resins was material dependant. The staining susceptibility of a material can also be attributed to its resin or filler type. DenFil is a microhybrid composite containing Bis-GMA, Bis-EMA, and TEGDMA and 0.6 to 0.8 μm sized fillers. It is interesting to note that the colour of stained specimen almost returned to the baseline after bleaching for the specimen which were bleached using the in office bleaching agent, even after a large discoloration after staining. These results show how effective the in office bleaching agent is in removing exterior stains on dental composite. However a limitation of this study is that no negative control was used during the bleaching stage, as a purpose of the study was to compare the two bleaching products. Thus the study does not prove that stained specimens would not return to their original color with an inert paste. Therefore the tentative conclusion of the study was that hydrogen peroxide was responsible for removing stain from the surface of the specimen and that the different concentrations (35% for Pola Office and 7% for Colgate Optic White) had different effects on the color change of the composites tested. The bleaching mechanisms of teeth is that the active agents can flow freely through the enamel, and dentin and oxidize the pigments in the teeth. The results of the present study indicate that the colour change of composite resins after bleaching was probably due to superficial cleansing of the specimen.

Conclusion

Although Bleaching agents can successfully remove the exterior staining from composite, the will not bleach them. Therefore bleaching the composite resin may not match the surrounding bleached tooth structure. (Haywood and Heymann, 1989; Gerlach *et al*., 2003) Also, bleaching can increase the surface roughness of the composite resins, therefore the restoration may stain more easily after bleaching (Turker and Biskin, 2003; Cehreli *et al*., 2003). It can be concluded that in office bleaching removes surface stains from composite restorations more than when compared to the home use bleaching kit. It is advised that the in office bleaching agents be used for patients with stains on composite restorations, providing better whitening effect.

REFEREN CES

Braden M. and Pearson, GJ. 1981. Analysis of aqueous extract from filled resins. *J Dent*, 9:141-3.

Cehreli ZC, Yazici R, Garcia-Godoy F. 2003. Effect of home-use bleaching gels on fluoride releasing restorative materials. *Oper Dent*, 28: 605-9.

Fan PL, Edahl A, Leung RL, Stanford JW. 1985. Alternative interpretations of water sorption values of composite resins. *J Dent Res*., 64:78-80

Ferracane JL. 1994. Elution of leachable components from composites. *J Oral Rehabil*., 21:441-52.

Gerlach RW, Gibb RD. and Sagel PA. 2002. A randomized clinical trial comparing a novel 5.3% hydrogen peroxide whitening strip to 10%, 15% and 20% carbamide peroxide tray-based bleaching systems. Compendium of Continuing Education in Dentistry, 23(Suppl. 1A):4–8.

Haywood VB. and Heymann HO. 1989. Nightguard vital bleaching. *Quintessence Int*., 20:173-6.

Iazzetti G, Burgess JO, Gardiner D. and Ripps A. 2000. Color stability of fluoridecontaining restorative materials. *Oper Dent*, 25:520-5.

Kroeze HJ, Plasschaert AJ, van't Hof MA, Truin GJ. 1990. Prevalence and need for replacement of amalgam and composite restorations in Dutch adults. *J Dent Res*., 69:1270-4.

Martin N, Jedynakiewicz NM. and Fisher AC. 2003. Hygroscopic expansion and solubility of composite restoratives. *Dent Mater*, 19:77-86.

Soderholm KJ, Zigan M, Ragan M, Fischlschweiger W. and Bergman M. 1984. Hydrolytic degradation of dental composites. *J Dent Res*., 63: 1248-54.

Stober T, Gilde H. and Lenz P. 2001. Color stability of highly filled composite resin materials for facings. *Dent Mater*, 17:87-94.

Turker SB. and Biskin T. 2003. Effect of three bleaching agents on the surface properties of three different esthetic restorative materials. *J Prosthet Dent*, 89:466-73.

Wilson NH, Burke FJ. and Mjor IA. 1997. Reasons for placement and replacement of restorations of direct restorative materials by a selected group of practitioners in the United Kingdom. *Quintessence Int*., 28:245-8.

Yap AU, Low JS. and Ong LF. 2000. Effect of food-stimulating liquids on surface characteristics of composite and polyacid-modified composite restoratives. *Oper Dent*, 25:170-6.

Yap AU. and Wee KE. 2002. Effects of cyclic temperature changes on water sorption and solubility of composite restoratives. *Oper Dent*, 27:147-53.

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