

Comparative Evaluation of the Effects of Two Commercially Available In Office Bleaching Products on the Surface of Composite Restorations- A Study

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Abstract:

Aim:

To evaluate the effects of bleaching products on the surface of tooth coloured restorations

Objective:

To understand the effect of bleaching products acting on the surface of different brands of tooth coloured composite resins

Background:

Tooth coloured restorations are composite resin 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 person's smile. Bleaching agents such as hydrogen peroxide and carbamide peroxide, the 2 most popular bleaching products, can change the physical properties if dental restorations such as their colour, surface roughness, hardness and ion leakage.

Reason for the project:

As dental whitening has become more accessible, many patients select this treatment for aesthetic reasons. In most cases, they want whiter teeth. Because of the popularity 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.

Key words: composites, in office bleaching, hydrogen peroxide

INTRODUCTION:

The aesthetic appearance of anterior teeth has become a major concern for patients. Discolored vital anterior teeth have been treated with different approaches, including crowns, direct and indirect veneers, composite resin restorations and most conservatively, bleaching. Both over the counter and in office bleaching techniques have proven effective in whitening teeth, with the latter having the advantage of producing immediate results^{[1],[2]}.

The typical in-office bleaching regimen involves application of a high percentage hydrogen peroxide formulation to the teeth surfaces, which is activated either chemically or by a light source^{[3],[4]}. The advantage of using lights is their ability to heat hydrogen peroxide, thereby enhancing the rate of oxygen decomposition. The increased amount of oxygen free radicals produced thus enhances the release of stain containing molecules and therefore results in enhanced whitening^{[5],[6],[7]}.

The effect of bleaching agents on tooth coloured restorations is not as yet fully known, as much as its effects on natural teeth. Resin composites are widely used as restorative materials because of their excellent aesthetic properties. However their initial color may change over time as a result of surface and marginal staining, as well as internal material deterioration^{[8],[9],[10]}. Staining of resin composites may be due to beverages such as coffee, tea and soda or by mouth rinsing agents^[11].

Monaghan et al reported that 30% hydrogen peroxide bleaching produced a significant color change in freshly

prepared specimens of different composites. However the ability of bleaching to remove acquired stains has not fully been investigated^{[12],[13]}.

The purpose of this study was to determine the color changes of two composites when subjected to coffee staining and bleaching using chemically activated in office bleaching systems. The null hypothesis was that the two composites will respond similarly to the different bleaching agents.

MATERIALS AND METHODS:

Two commercially available resin composites, Fusion Flo and Filtek Z350 Universal Restorative of A3 shade were used in this study. 10 specimens 15mm in diameter and 2 mm thick were fabricated from each material. Each specimen was prepared as one increment and light polymerized from each side for 40 seconds using light unit. Each specimen was divided into 2 subgroups of 5 each and assigned to two bleaching agents, Polaoffice and Florence. All subgroups were subjected to an initial bleaching session after which the color was noted. Bleaching was also carried out after staining in coffee. Specimens were stored in distilled water at 37 degrees C for 24 hours and analysis.

Color assessment was interpreted using a colorimeter. Colorimetric measurements were performed before bleaching, after bleaching and staining, and after second bleaching.

RESULTS:

Variable	Material	Bleaching Agent	Colorimetric reading (E)
Before Bleaching	Fusion Flo		2.1
	Filtek		2.0
After bleaching	Fusion Flo	Polaoffice	1.9
		Florence	2.0
	Filtek	Polaoffice	2.0
		Florence	2.0
After staining	Fusion Flo		3.4
	Filtek		3.2
After second bleaching	Fusion Flo	Polaoffice	2.3
		Florence	2.7
	Filtek	Polaoffice	2.1
		Florence	2.5

After initial bleaching, the specimen showed little changes in colour and shade. The Polaoffice subgroups showed improvement in their shade while the change in the Florence sub groups was not significant.

The colour difference after the second bleaching session from baseline was higher in the Polaoffice subgroups than the Florence subgroups. The Florence subgroups still showed traces of coffee stains after the second bleaching session, visible on both the composite brands.

From the above results, it can be concluded that none of the bleaching systems notably changed the color of any of the composites prior to staining. No significant difference was found between the two composites, confirming that freshly prepared composites are color stable. The readings obtained after the second bleaching procedure show that Polaoffice has a better whitening effect than Fluorescence, in terms of their bleaching capacity.

DISCUSSION:

The bleaching products adopted in the current study namely Polaoffice and Florence are Hydrogen Peroxide bleaching agents. These bleaching systems solely depend on chemical activation and required no light activation.

The results of the present study are in agreement with the findings of a recently published study^[14]. More specifically, they revealed that none of the bleaching systems notably changed the color of any of the composites tested after the initial bleaching session. Also no significant difference was found between the two composites. This confirms that freshly prepared composites are color stable. Comparing the current results to those obtained in the studies, it is concluded that composites do not bleach to the same degree as teeth. Therefore replacement of such restorations may be a more effective option.

The second treatment to which the composites were subjected was a staining procedure which reflects the conditions of the oral environment, in which restorations

are exposed to coffee drinks. Coffee was chosen in this study as a staining solution because it has shown to have a strong staining effect on composites as well as on natural teeth. According to Um and Ruyter^[15], discoloration by coffee occurs both by adsorption and absorption of colorants by resin based restorative materials. The authors explained that this was maybe due to the compatibility of the polymer phase of the resinous materials with the yellow colorant of the coffee which served to facilitate this adsorption and penetration of colourants.

In both brands tested, whitening of the stained specimens was greater with Polaoffice than Florence. This may suggest that Polaoffice may have a better chemical activation than Florence, and a better whitening effect on stained composite. Generally, the mechanism of color change in resin composite when exposed to vital bleaching regimes includes oxidation of surface pigments, oxidation of amine compounds, or breakdown of poorly polymerized resin matrix. Therefore it may be concluded that Polaoffice has a better whitening effect than Florence, in terms of their bleaching capacity.

CONCLUSIONS:

- In office bleaching may remove surface stains from composite restorations but it will not whiten unstained ones
- Polaoffice has a better whitening effect than Florence, in terms of their bleaching capacity.

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