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Original ARTICLE

Evaluation of effect of bleaching agents on composite color- An invitro study

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ABSTRACT

Background: Effect of bleaching on dental restorative materials in general has been reviewed recently. The present study was conducted to assess the effect of bleaching agents on color of composites. **Materials and Methodology**: The present invitro study was conducted on 50 freshly extracted permanent mandibular premolars. Two class V cavities measured 4 mm high, 3 mm wide and 2 mm deep were created in each tooth. The specimens were divided into 5 groups of 10 each. Group I specimens were control, group II specimens were treated with 7% hydrogen peroxide, group III, specimens were treated with 35% hydrogen peroxide, group IV with 10% carbamide peroxide and group V with 35% carbamide peroxide. The values were measured. **Results**: The mean value of color change in group I was 29.8, in group II was 30.1, in group III was 29.8, in group IV was 29.1 and in group V was 29.5. The result of color measurements between all the groups was statistically insignificant (P> 0.05). **Conclusion**: Composite samples showed no significant alteration in color change with different concentration of hydrogen peroxide and carbamide peroxide after bleaching.

Key words: Composite, Carbamide peroxide, hydrogen peroxide

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INTRODUCTION

Effect of bleaching on dental restorative materials in general has been reviewed recently. Due to their organic matrix, composite resin materials especially are more prone to chemical alteration compared to inert metal or ceramic restorations. Although the application of low concentrations of CP on tooth structure causes minimal surface changes, however high-concentration solutions modify the enamel surface. Bleaching agents also deteriorate the surface of existing composite restorations and induce bacterial adhesion.[1]

In the case of whitening agents, the whitening effect is due to pH, whereby the higher the concentration, the greater the oxidation process of resin composites and the color changes generated will be. Even a low concentration of HP can affect the color of photopolymerizable composites.[2]

The effects of CP (home bleaching) on the surface microhardness are material-dependent. Significant increase in the surface microhardness of glass-ionomer cement after exposure to 15% CP was verified. However, bleaching agents produced a significant microhardness decrease for compomer.[3] No significant surface microhardness changes were found after application of 15% CP for composite resin. However, other studies show that the bleaching agents do not reduce the microhardness of the restorative materials. Studies have investigated color changes to composites used for dental restoration in situ in teeth after exposure to dental whitening agents, as most experiments have measured color changes using small blocks of resin in isolation.[4] The present study was conducted to assess the effect of bleaching agents on color of composites.

MATERIALS & METHODS

The present in vitro study comprised of 50 freshly extracted permanent mandibular premolars. Two class V cavities measured 4 mm high, 3 mm wide and 2 mm deep were created in each tooth. Following this, teeth were then sectioned in mesial-distal direction with a diamond disc driven by a hand-piece, cutting each tooth into two halves and cleaning the pulp chambers with a

curette. All sections were filled with composite resins as per manufacturer instructions. Initial quantitative colour (ΔE) measurements were performed by the use of a spectrophotometer using formula- ΔE = [(ΔL∗)2 + (Δa∗)2 + (Δb∗)2]1/2, where L∗ represents lightness, a∗ redness-greenness and b∗ yellowness-blueness.

The specimens were divided into 5 groups of 10 each. Group I specimens were control, group II specimens were treated with 7% hydrogen peroxide, group III, specimens were treated with 35% hydrogen peroxide, group IV with 10% carbamide peroxide and group V with 35% carbamide peroxide. The values were measured. Results thus obtained were subjected to statistical analysis. P value <0.05 was considered significant.

RESULTS

Table I Distribution of tooth

GP	Group I	Group II	Group III	Group IV	Group V
Agent	Control	7 % hydrogen peroxide	35 % hydrogen peroxide	10% carbamide peroxide	35% carbamide peroxide
Number	10	10	10	10	10

Table I shows that group I specimens were control, group II specimens were treated with 7% hydrogen peroxide, group III, specimens were treated with 35% hydrogen peroxide, group IV with 10% carbamide peroxide and group V with 35% carbamide peroxide. The specimens were divided into 5 groups of 10 each.

Table II, graph I shows that mean value of color change in group I was 29.8, in group II was 30.1, in group III was 29.8, in group IV was 29.1 and in group V was 29.5. The result of color measurements between all the groups was statistically insignificant (P> 0.05).

Graph I Color Measurements in all groups

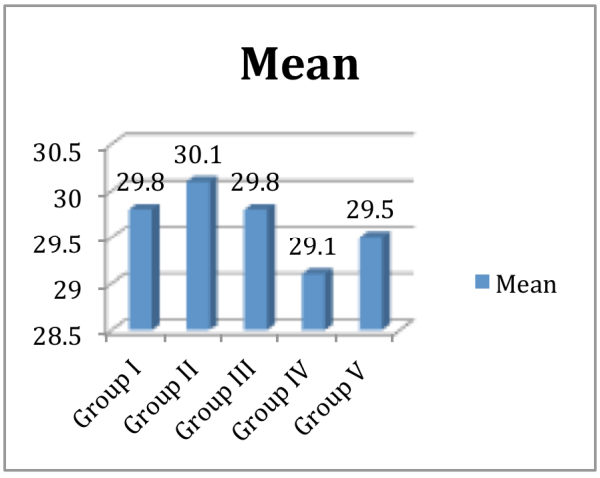

Table II Color Measurements in all groups

Groups	Mean	P value
Group I	29.8	0.15
Group II	30.1	
Group III	29.8	
Group IV	29.1	
Group V	29.5	

DISCUSSION

Today “whiter teeth” is the most common aesthetic request from dental patients and tooth whitening is a relatively noninvasive approach to achieving this goal. As bleaching of teeth has become extremely popular, the effect of bleaching on aesthetic appearance of dental materials must be considered. This complicates the process of trying to establish and maintain good color match between the dental restoration and the adjacent tooth structure. Changes in the chemical and morphological structure of restorations must be of concern when bleaching is used as a whitening treatment. [5]

Mixing sodium perborate with hydrogen peroxide had shown to accelerate the rate of colour change. In the case of severe discolouration, it is safe to mix sodium perborate with a 3% solution of hydrogen peroxide; however it is not appropriate to use 30% hydrogen peroxide because of the possible risk of inducing cervical root resorption. Recently, sodium perborate in the form of strips and gels have been introduced which are available for home bleaching procedures. Bleaching agents deteriorate the surface of existing surface restoration which may induce bacterial adhesion.[6] The present study was conducted to assess the effect of bleaching agents on color of composites. In present study, we included 50 permanent premolars and divided it into 5 groups. Group I specimens were control, group II specimens were treated with 7% hydrogen peroxide, group III, specimens were treated with 35% hydrogen peroxide, group IV with 10% carbamide peroxide and group V with 35% carbamide peroxide. The specimens were divided into 5 groups of 10 each.

We found that the mean value of color change in group I was 29.8, in group II was 30.1, in group III was 29.8, in group IV was 29.1 and in group V was 29.5. 7. Villalta et al[7] evaluated composite resins for changes in surface hardness, roughness, and lightness after exposure to 10% carbamide peroxide gels and found that these three parameters increased significantly after exposure. Monaghan et al[8] reported that 10% carbamide peroxide and 30% hydrogen peroxide had no significant effect on tensile strength of highly filled composite resins. However, microfilled composite resins were significantly affected by 30% hydrogen peroxide, resulting in a reduction in tensile strength.

Four different approaches for tooth whitening have been recognized such as dentist-administered bleaching—the use of a high concentration of hydrogen peroxide (from 35 to 50%) or carbamide peroxide (from 35 to 40%), often supplemented with a heat source; (b) dentist-supervised bleaching—by means of a bleaching tray loaded with high concentrations of carbamide peroxide (from 35 to 40%) that is placed in the patient's mouth for 30 min to 2 hrs while the patient is in the dental office; (c) dentist-provided bleaching— known as "at-home" or "night-guard" bleaching and administered by the patient applying from 5 to 22% solution of carbamide peroxide in a custom-made tray; (d) over-the counter products, often based on carbamide peroxide or hydrogen peroxide of various concentrations are placed in a pre-fabricated tray, or by the recently introduced strips both to be used by the patient.[9] Currently available home bleaching agents often contain up to 10% hydrogen peroxide (HP) or 22% carbamide

peroxide (CP) as active ingredients, but products containing 10% CP appear to be most popular.10 The effects of CP (home bleaching) on the surface microhardness are material-dependent.

CONCLUSION

Authors suggested that composite samples showed no significant alteration in color change with different concentration of hydrogen peroxide and carbamide peroxide after bleaching.

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