Antioxidant agents on bond strength of bonded bleached teeth: Literature review

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INTRODUCTION

Previous studies have shown that Hydrogen Peroxide (HP) and Carbamide Peroxide (CP) used as bleaching agents may adversely affect the bond strength of composite resin bonded to the tooth surface when adhesive procedures are performed immediately after the bleaching treatment.1 This reduction on bond strength of composite resin to bleaching is related to the presence of oxygen, a break down product of HP, because the residual oxygen might interfere with resin infiltration into the dentinal tubules and inhibit the polymerization of resin monomers.2-3

To avoid the resulting effects of these bleaching procedures, many studies have been conducted over the last 1-3 weeks, until the restoration procedures after the tooth bleaching.4-5 Recently many antioxidant agents has been investigated for its potential capability to reverse the temporary weakening effects of bleaching agents on the cohesion of the composite resin.6

OBJECTIVE

To review and to research in vitro studies that evaluate the effect of antioxidant agents on the bond strength of bonded bleached teeth.

METHODS

The research strategy was performed using the PubMed / MEDLINE electronic database, using the keywords: “antioxidant agent”, “bond strength”, “dental bleaching” and “composite restoration”. Inclusion criteria included in vitro studies published between 2011 and 2017. The exclusion criteria consisted in systematic or narrative reviews and case studies. The selection process followed the QUOROM flowchart method, having been carried out by two independent reviewers.

RESULTS

<table>
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<tr>
<th>STUDY</th>
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<td>Dobson et al., 2011</td>
<td>To evaluate the effect of different concentrations of Sodium Ascorbate (SA) on the shear bond strength of bleached enamel with 17% Carbamide Peroxide (CP) – varying periods of time</td>
<td>A (n=30): Control (untreated)</td>
<td>B (n=30): 35% CP; C (n=30): 17% CP; D (n=30): 0% CP; E (n=30): 15% SA; F (n=30): 10% SA</td>
<td>There was no difference in bond strength with an increase in the concentration of Sodium Ascorbate.</td>
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<td>Vithala et al., 2011</td>
<td>To assess the neutralizing effect of grape seed extract on the shear bond strength of bleached enamel with 28% Hydrogen Peroxide</td>
<td>Group I, II, III and IV were further subdivided into 2 subgroups of 10 teeth each.</td>
<td>10% Sodium Ascorbate (Group I) and grape seed extract - Group III: Control group - Group IV: Aloe vera - Group V: Sodium Ascorbate, both when bonding was performed immediately and after delay of 2 weeks.</td>
<td>The use of grape seed extract prior to bonding procedures on enamel bleached with 35% Hydrogen Peroxide (10 min) could completely neutralize the effect of bleaching agents and increase significantly the bond strength.</td>
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<td>Sharafeddin et al., 2014</td>
<td>To assess the effect of different antioxidants on the shear bond strength of composite resin to home-bleached teeth with 10% Carbamide Peroxide (CP)</td>
<td>A (n=15): Control – 15% CP treated with 10% Carbamide Peroxide solution - 10 minutes and 2 applications – 1 minute</td>
<td>There was no significant difference observed between the SBS of Group I and the groups treated with antioxidants: (A: 12.4 ± 1.6 MPa; B: 13.37 ± 1.43 MPa; C: 13.49 ± 2.1 MPa; D: 13.76 ± 1.19 MPa; E: 13.48 ± 2.03 MPa).</td>
<td>Different antioxidants used in this study had the same effect on the SBS of home-bleached enamel, and none of them caused a statistically significant increase in its bond strength.</td>
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<td>Kasdall et al., 2015</td>
<td>To compare and evaluate the effect of different areas of the mouth on the shear bond strength of composite resin to bleached enamel with 10% Carbamide Peroxide (CP)</td>
<td>A (n=10): Control (no bleaching)</td>
<td>III (n=10): 15% CP + 10% Grape Seed extract - 10 minutes</td>
<td>The mean microtensile bond strength values for the different antioxidant agents were significantly higher than those of the negative control group.</td>
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<td>Carvalho et al., 2016</td>
<td>To evaluate the antioxidant activity of Green tea (GT) and Sodium Ascorbate (SA) within three concentrations (10%, 30% and 50%) and their influence on the microtensile bond strength (%) of resin composite to bleached enamel with 10% Carbamide Peroxide (CP)</td>
<td>G1 (n=20): Positive control – no treatment</td>
<td>G2 (n=20): Negative control – bleached with CP</td>
<td>The higher the concentration, the lower the SBS values:</td>
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<td>Santos et al., 2016</td>
<td>To assess the effect of 10% Sodium Ascorbate (SA) and 5% Grape seed extract on the shear bond strength of 35% Hydrogen Peroxide (HP)</td>
<td>G1 (n=20): Positive control – no treatment</td>
<td>G2 (n=20): 35% SA + 5% Grape seed extract - 10 minutes</td>
<td>There was a statistically significant difference between the shear bond strength values of groups I, II, IV and V: (p = 0.007).</td>
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</table>

CONCLUSION

The use of antioxidant agents after bleaching neutralizes the deleterious effects of bleaching and increases bond strength values closer to the usual values. However, this effect is dependent on the type of antioxidant, concentration and duration of the application.

Therefore, antioxidant treatment can be considered a successful technique to improve the bond strength of bonded teeth after bleaching.

REFERENCES