



0030

Effectiveness of Hydrogen Peroxide-Free Bleaching Agents on Color Change

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Objectives The purpose of this in vitro study was to evaluate the effectiveness of five bleaching gels with four different active agents with the same active concentration when applied to human teeth following at-home bleaching treatments.

Methods Human intact incisors were collected and the crowns were separated from the roots. For tooth color change assessment the tooth specimens were randomly distributed to 5 groups (n=6) and received at-home bleaching treatment for 14 days by applying the bleaching gel for 30 min each day. During this period the teeth were stored in artificial saliva at 37°C. In Group 1 a bleaching gel containing 3% phthalamidioperoxyacetic acid (PAP) was applied, in Group 2 the gel contained 17.3% polyvinylpyrrolidone (PVP) with 3% bounded hydrogen peroxide (H₂O₂), in Group 3 it contained 3% H₂O₂, in group 4 it contained 8.6% carbamide peroxide (equivalent of 3% H₂O₂) and in Group 5 the gel had the same composition with Group 1 but without PAP. Tooth color change (ΔE_{ab}^* and ΔE_{00}) and whiteness index (ΔWI_D) was evaluated 24 h, 15 and 30 days after the treatments using a spectrophotometer.

Results All the experimental groups exhibited ΔE_{00} and ΔWI_D higher than 50:50% acceptability (AT: $\Delta E_{ab}^* > 2.66$, $\Delta E_{00} > 1.77$, $\Delta WI_D > 2.6$) and 50:50% perceptibility (PT: $\Delta E_{ab}^* > 1.22$, $\Delta E_{00} > 0.81$, $\Delta WI_D > 0.7$) thresholds. The highest tooth color and whiteness changes presented the PAP-containing bleaching agent ($\Delta E_{ab}^* = 7.35 \pm 3.72$, $\Delta E_{00} = 3.79 \pm 1.58$, $\Delta WI_D = 7.35 \pm 3.72$), while the lowest the PVP-containing bleaching agent ($\Delta E_{ab}^* = 3.67 \pm 1.39$, $\Delta E_{00} = 1.97 \pm 0.46$, $\Delta WI_D = 3.67 \pm 1.39$).

Conclusions The use of a novel H₂O₂-free bleaching agent presented comparable and even better effectiveness in color change when compared to conventional H₂O₂-containing bleaching agents for at-home bleaching treatment.