Tooth Whitening Effect of Non-erosive Polymer based Hydrogen Peroxide Composition

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Objectives: In this study, the whitening efficacy and water resistance of polyvinyl acetate (PVAc), a non-erosive polymer, were investigated and compared with other tooth whitening hydrogen peroxide (H_2O_2) compositions.

Methods: Oral applicable polymer solutions such as polyvinyl pyrrolidone (PVP) and polyvinyl acetate (PVAc) were prepared at a concentration of 15 wt.% in ethanol medium. 35% hydrogen peroxide solution was slowly added into prepared solutions in order to contain 2.8% hydrogen peroxide. Prepared PVP- H_2O_2 and PVAc- H_2O_2 compositions were coated on slide glass. To evaluate water resistance, the coated samples were exposed 37°C water bath as similar to oral condition during one hour and 12 hours. Also, to confirm whitening effect (*in-vitro*), HAP discs were stained by Stookey-method. The oral applicable polymer compositions were treated on the stained HAP disc for one hour and 12 hours and then rinsed using ethyl alcohol and DI water. After each treatment the L^* , a^* , b^* values were observed, then the overall color change (ΔE) was calculated compared to the initial measured values.

Results: PVAc- H_2O_2 whitening composition as opposed to PVP- H_2O_2 composition exhibited water resistance for 12 hours because of non-erosive feature of polyvinyl acetate. In the whitening estimation for one hour, all oral applicable polymer compositions which contain of 2.8% hydrogen peroxide exhibited similar results ($p \geq 0.05$). However, non-erosive tooth whitener as PVAc- H_2O_2 composition indicated more improved whitening effect than other tooth whitener composition such as PVP- H_2O_2 under 12 hours whitening evaluation ($p \leq 0.05$). The ΔE values of PVP- H_2O_2 and PVAc- H_2O_2 compositions were 3.461 and 3.585 under one hour. On the other hand, the ΔE value of PVAc- H_2O_2 composition as 7.204 was higher than that of PVP- H_2O_2 composition as 4.632 under 12 hours.

Conclusions: Non-erosive polyvinyl acetate (PVAc) whitening composition showed a water resistance in similar oral condition and indicated an excellent tooth whitening effectiveness.

Keywords: tooth whitener, polyvinyl acetate, non-erosive, polyvinyl acetate, whitening effectiveness