

Influence of chemical activation of a 30% hydrogen peroxide on the enamel surface

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1. Introduction

Tooth bleaching is one of the most popular aesthetic procedures used in modern day dentistry due to its non-invasive and relative simple to carry out, even though it has limitations in severely discolored teeth (Haywood, 1999). For these reasons, the tooth bleaching has rapidly become more prevalent option to patients demand for whiter teeth (Amato *et al.*, 2006). The main types of bleaching agent is used hydrogen peroxide (H_2O_2) in a variety of concentrations (Haywood and Heymann, 1989). The recent bleaching agents are based on 35–50% H_2O_2 . It is highly effective at removing chromogens deposited on enamel and dentin of teeth (Sun 2000). As a result, the teeth will whiten faster. But the problem of utilization high concentrations of H_2O_2 has been associated with undesirable side effects (Price *et al.*, 2000; Dezottiet *al.*, 2002). The aim of this study was to evaluate the influence on bleached teeth with 30% H_2O_2 using microhardness.

2. Materials and methods

2.1. Tooth bleaching procedure

Forty freshly extracted intact caries-free human teeth were stored in 0.4% sodium azide solution until required. Any debris and soft tissues was thoroughly removed with a dental scaler and cut with water-cooling with diamond saw. Each human enamel and dentin was randomly assigned to two groups. Group 1 was used as control without treatment. Group 2 was treated high concentrations of 30% H_2O_2 for 30 minutes.

2.2. Tooth bleaching efficacy

The color change of each group is evaluated based on the Commission Internationale de L'Eclairage (CIE Lab) Color System using Adobe® Photoshop CS2. According to this system, all colors are virtually expressed in three values, L^* (brightness), a^* (red-green) and b^* (yellow-blue).

2.3. Measurement of microhardness

The Vickers microhardness on the surface were conducted to determine demineralization effects in enamel surface with a microhardness tester (MVK-H1, Akashi Co., Japan).

2.4. Statistical analysis

Student *t*-test was used to determine the statistical difference between two groups. The level of significance was established as $p < 0.05$.

3. Results

There was a significant difference between groups 1 and 2. This bleaching efficacy led to a significant color change of experimental group compared to control group ($p < 0.05$). The microstructural changes in the enamel surface resulted from the microhardness by bleaching with 30% H_2O_2 treatment.

4. Discussions

HP is a strong oxidizing agent which releases oxygen; it is likely that it is this action that results in the removal of stains. Unfortunately, high concentration of H_2O_2 might have a deleterious impact on bleached dental hard tissues. This study demonstrated that deleterious effect of the bleaching treatments on the microhardness was evident. It may be suggested that significant demineralization of enamel occurred following tooth bleaching with 30% H_2O_2 in cosmetic procedure.

5. References

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