

Intrapulp peroxide concentration of teeth submitted to violet LED-assisted in-office bleaching

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Abstract

This research aimed to evaluate the intrapulp concentration of peroxide after in-office bleaching with high-concentrated chemical agents associated with a novel violet LED. The thickness of crowns specimens was standardized and during the last bleaching appointment, an acetate buffer was placed in pulp chamber to stabilize hydrogen peroxide. This buffer was collected and transferred to a test-tube, in which peroxidase horseradish and leucocristal violet was added in order to proceed spectrophotometry evaluation. To sum up, violet LED-irradiation did not influence the intrapulp peroxide concentration, but the HP concentration was dependent on the bleaching gel concentration.

Key words: *Tooth Bleaching, Hydrogen Peroxide, LED*

Introduction

A novel violet LED device has been introduced into the market with the purpose of bleaching teeth with no chemical agents or associated with high-concentrated bleaching gels (MMOptics, 2017).

It is known that hydrogen peroxide (HP) can reach pulp even in teeth with no restorations (Cavalli et al., 2016) and this could contribute to tissue damage and/or provoke tooth sensitivity (Camargo et al., 2009; Markowitz, 2010).

The aim of this study, therefore, was to investigate the intrapulp penetration of peroxide due to in-office bleaching light-activated with violet LED light.

Results and Discussion

In order to obtain data, forty incisor crowns were standardized with a thickness of 4 mm. An area of 64 mm² was demarcated in each tooth, in which bleaching was performed as follows (n=10):

(LED/HP) hydrogen peroxide 35% (HP, FGM) associated with 20 1-min irradiations with consecutive 30-s intervals;

(HP) hydrogen peroxide itself;

(LED/CP) carbamide peroxide 37% (SuperEndo, FGM) light-activated with same light protocol;

(CP) only carbamide peroxide 37%.

* The bleaching was performed in three sessions with a single 30-min gel application and teeth were maintained in artificial saliva among the 7-day intervals.

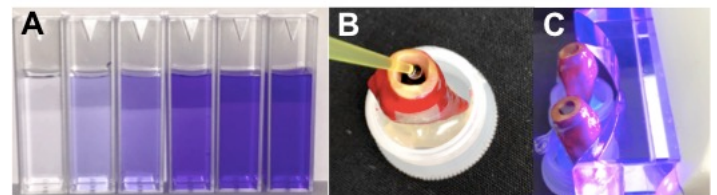
* In the last session, intrapulp concentration of HP was evaluated by means of spectrophotometry ($\lambda=596\text{nm}$). A calibration curve was performed with hydrogen peroxide standards from 0.25 to 2.0 mg/mL (Image 1.A).

* 150 μL of an acetate buffer was placed in the pulp chamber during gel application (Image 1.B and 1.C), and then transferred to a test-tube with horseradish

peroxidase (50 μL de 1 mg/mL; Sigma-Aldrich) and leucocristal violet (100 μL de 0.5 mg/mL; Sigma-Aldrich).

* Data were analyzed by one-way ANOVA and Tukey's test.

Image 1.



* Differences were observed in the intrapulp concentration of HP for the LED/HP and LED/CP groups ($p=0.025$).

* However, the intrapulp concentration of HP did not increase with the violet LED irradiation ($p>0.05$).

Conclusions

In conclusion, violet LED-irradiation did not influence the intrapulp peroxide concentration, but the HP concentration was dependent on the bleaching gel concentration.

Acknowledgement

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¹ Camargo SE, Cardoso PE, Valera MC, de Araújo MA, Kojima AN. Penetration of 35% hydrogen peroxide into the pulp chamber in bovine teeth after LED or Nd:YAG laser activation. *Eur J Esthet Dent*. 2009 Spring;4(1):82-8.

² Markowitz K. Pretty painful: why does tooth bleaching hurt? *Med Hypotheses*. 2010 May;74(5):835-40.