

Evaluation of Optical Properties of Nanocomposite Submitted to Action to Different Mouthrinses and Aging Process

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Abstract

The in vitro study evaluated the effect of different mouthrinses (Colgate Plax Classic - CPC, Listerine - LI, Colgate Plax Whitening - CPW) on the optical properties of color (ΔE) and brightness (GU) of a nanoparticle composite subjected or not to Artificial Aging Accelerated (AAA). The treatment with mouthrinses did not affect the nanocomposite before the aging process. After the aging process, both evaluated properties have changed, and the CPC mouthrinse promoted a greater extrinsic staining.

Key words:

Spectrophotometry, mouthrinse, composite resin.

Introduction

The composites are materials with excellent aesthetic and mechanical properties. However the aging process and the not restorations preservation can increase surface roughness and facilitate biofilm accumulation, which, therefore, can lead to the occurrence of secondary caries and periodontal disease when associated with a poor buccal hygiene¹.

In this way, for the prevention and control of these diseases, mouthwashes have been widely indicated. Thus, the study aims to investigate the effect of different mouthrinses containing alcohol, hydrogen peroxide and dyes on the optical properties of color and brightness of an exposed nanocomposite exposed or not to the AAA.

Results and Discussion

In brightness, the different treatment with mouthwashes showed no statistically significant differences for both samples, with aging and without aging ($p > 0,05$). However, when aged, lower values were found ($p > 0,05$), (Table 1).

Table 1. Mean (standard deviation) of brightness values as a function of the treatments and aging process.

Treatment	Aging	
	With	Without
CPC	40,52(3,67) Ba	84,10(4,18) Aa
LI	37,36(3,99) Ba	89,10(4,43) Aa
CPW	40,41(4,75) Ba	89,60(4,55) Aa
ST	38,35(3,56) Ba	87,88(4,63) Aa

Mean followed by different letters (uppercase letters on horizontal and lowercase letters on vertical) indicate statistical differences ($p \leq 0,05$). (By ANOVA and Tukey's test)

Regarding the color, the samples without aging did not show statistical differences ($p > 0,05$). However, the aged samples differed from each other ($p > 0,05$), with higher values of ΔE , in respective (CPC > LI > CPW), and differ from control ($p \leq 0,05$), (Tabela 2).

Table 2. Mean (standard deviation) of ΔE values in function of the treatments and aging process.

Treatment	Aging	
	With	Without
CPC	*17,00(1,99) Aa	1,02(0,55) Ba
LI	*14,36(0,61) Ab	0,78(0,33) Ba
CPW	*12,22(0,81) Ac	0,85(0,44) Ba
ST	14,41(1,26)	-

Mean followed by different letters (uppercase letters on horizontal and lowercase letters on vertical) indicate statistical differences ($p \leq 0,05$). * Differs from the untreated group ($p \leq 0,05$). The group without treatment and without aging was used as the baseline for the calculation of ΔE . (By ANOVA, Tukey's test and Dunnett's test)

The aging process initiated physico-chemical reactions in the composite² causing its intrinsic and surface degradation, resulting in an increased roughness. Regarding color, there was a significant increase in ΔE clinically unacceptable³ for all groups. Roughness probably contributed to a change in light reflection, which reduced the brightness values, and facilitated the pigments incorporation¹ in the CPC and LI groups, which further increased the ΔE values. In the CPW group the values were reduced by a likely surface leaching caused by H_2O_2 .

Conclusions

We can conclude that in the samples without aging, treatment with mouthrinses caused no change. Already the AAA changed all studied properties. Thus, treatment with Colgate Plax Classic caused major changes in color composite when compared with other treatments.

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² Ferracane, J.L. Hygroscopic and hydrolytic effects in dental polymer networks. Dental Materials. V. 22, p. 211-222, 2006.

³ Mohammadi N, Kimyai S, Abed-Kahnamoii M, Ebrahimi-Chaharom ME, Sadr A, Daneshi M. Effect of 15% carbamide peroxide bleaching gel on color stability of zirconia and microfilled composite resin: An in vitro comparison. Med Oral Patol Oral Cir Bucal;17(6):1082-1088, 2012.