



## Bleaching efficacy of in-office bleaching with violet light using low-concentration hydrogen peroxide nanoparticulate photocatalyst gel: A randomized controlled trial

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### ABSTRACT

**Objective:** This randomized controlled trial aimed to evaluate the bleaching efficacy and tooth sensitivity (TS) of participants submitted to different application protocols of in-office bleaching with violet light using 6 % hydrogen peroxide (HP) nanoparticulate photocatalyst gel.

**Materials and methods:** Sixty-six participants were randomized and bleached using either a 6 % HP (Nano White, DMC), and/or violet light (Bright Max Whitening, MMOptics), according to the following protocols: 1) only violet light (VIOL); 2) only bleaching gel application (BG) and; 3) combined bleaching gel application + violet light (BG+VIOL). The bleaching efficacy was evaluated with the Vita Easyshade spectrophotometer, Vita Classical and Vita Bleachedguide scales. The risk and intensity of TS were recorded using a 0–10 visual analogue scale (VAS) and a 0–4 numerical scale (NRS). Color change and intensity of TS values were compared using one-way ANOVA and Tukey's test were used. The absolute risk of TS was compared using the Chi-square test ( $\alpha = 0.05$ ).

**Results:** A significant and higher degree of bleaching was observed in the BG and BG+VIOL groups compared to the VIOL group ( $p < 0.003$ ). Despite no significant differences in the risk ( $p > 0.07$ ) and intensity ( $p > 0.28$ ) of TS among groups, a higher risk of TS was observed in the BG and BG+VIOL groups.

**Conclusions:** Using VIOL reduced the risk of TS but did not improve bleaching. However, BG+VIOL with low-concentration HP nanoparticulate photocatalyst gel achieved equal efficacy and was less likely to cause TS compared to BG.

### 1. Introduction

In-office dental bleaching has become popular due to visible results often seen immediately after the first session [1]. Generally, the protocol includes retracting the soft tissues and protecting the gingival tissue with a light-cured barrier [1,2]. After protecting the patient, high concentrations of hydrogen peroxide (HP) [30–40 %] in gel form are applied to the buccal tooth surfaces. The bleaching gel, typically peroxide-based, does not remain confined to the enamel surface [3]. It, along with its free radicals, penetrates the dental structure and interacts

with underlying tissues, producing the whitening effect desired by patients [3]. However, the bleaching agent is not restricted to the hard tissues alone [3,4]. Due to its permeability, it can reach the dental pulp [3,4], potentially causing inflammatory responses [5]. This reaction leads to the most reported adverse effect in both clinical studies and practice: tooth sensitivity (TS) [6,7].

One of the alternatives to reduce TS is the use of lower concentrations of HP, specifically 6 % [8–12]. This technique has gained prominence [8], particularly among patients with pre-existing dentin hypersensitivity and younger patients who prefer in-office bleaching

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