ABSTRACT

Influence of the addition of TiO_2 nanoparticles and different post-curing equipment on the physical-mechanical properties of the resin for 3D printing

Introduction: Three-dimensional technology is a high-tech advancement that is being implemented in many dental applications, showing good quality in the manufacture of surgical guides, diagnostic models, as well as provisional restorations. Recent studies show that impression resin can be modified with nanostructures to optimize the final properties of dental restoration, such as the processing steps of 3D printing. **Objective:** The influence of the addition of two nanoparticles of TiO_2 (titanium dioxide) and three post-cure equipment on the physical properties of a biocompatible 3D printing resin was evaluated. **Material and Method:** Ninety resin specimens (Cosmos Temp) were prepared and divided into 9 groups (n=10), according to the variation factor: post-cure method (Home Made, Valo, Wash and Cure) and type of nanoparticles (control; nanoparticles TiO_2 doped with Mn; TiO_2 nanoparticles). Surface roughness, surface microhardness and color stability (ΔE00) were evaluated. The results were analyzed using two-way ANOVA and Tukey (α = 5%). **Results:** For roughness, significant differences were found for nanoparticles (p=0.00) and post-curing (p=0.003), as well as their interaction (p=0.00). For surface microhardness, significant differences were found for nanoparticles (p=0.0001), post-curing (p=0.002) and their interaction (p=0.00). For ΔE00, significant differences were observed for the addition of nanoparticles (p<0.001), post-cure (p<0.001) and their interaction (p<0.001). For hardness and roughness, resins with addition of TiO_2 nanoparticles had higher values. The Home Made and Valo curing chamber showed better roughness and hardness values. When the post-cure was performed with Valo, the control resin showed higher ΔE00 and the resin with TiO_2 doped with Mn showed lower values. **Conclusion:** It was concluded that the addition of TiO_2 nanoparticles increased roughness and hardness values. Home Made and Valo curing chambers showed better results when compared to Wash and Cure.

Keywords: Three-dimensional printing; nanostructures; polymerization; manganese; titanium.