## ABSTRACT

**Evaluation of physical-mechanical properties of resin for 3D printing against the incorporation of $TiO_2$ nanotubes and light exposure by layers at different times**

**Introduction**: 3D printing is becoming more and more present in clinics and dental offices and, despite the numerous advantages of this technique, the available materials and the varied printing parameters generate uncertainties regarding the reliability of the quality and durability of the printed parts. The aim of the present study was to evaluate the physical-mechanical properties of a temporary resin for 3D printing modified by adding TiO2 nanotubes and printed using different times of light exposure per layer. **Material and Method:** The present work presented two variation factors: time of exposure to light per layer of resin for printing in three levels (10s, 15s and 20s) and presence of TiO2 nanotubes in two levels (presence or absence). Response variables were: Vickers microhardness, surface roughness and color stability before and after accelerated artificial ageing. Sixty specimens were printed with provisional Cosmos TEMP, with or without the addition of 0.9% by mass of TiO2 nanotubes. The specimens were divided into groups (n=10) according to the time of exposure to light per layer and the presence or absence of nanotubes in their structure. They were analyzed using the two-way ANOVA test and the Tukey test for multiple comparisons, adopting a significance level of 5%. **Results:** For color stability, using the CIE-Lab formula (ΔE), significant differences were observed for the addition of nanotubes (p=0.000217) and interaction effect between addition of nanotubes and light exposure time per layer ( p=0.000292). For surface roughness, the addition of nanotubes (p = 0.000032), the time of exposure to light per layer (p=0.026088) and the interaction effect between them (p=0.000266) were significant. Regarding the Vickers microhardness, the time of exposure to light per layer (p=0.000000) and the interaction between addition of nanotubes and time of exposure to light per layer layer (p=0.000968) were significant. **Conclusion:** Results suggest that the addition of TiO2 nanotubes, at the concentration used in this study, was able to decrease the color stability, increase the microhardness when the light exposure time per layer was reduced, and did not significantly increase the surface roughness. Regarding the time of exposure to light per layer, with increasing time there was a significant increase in microhardness but it was not able to improve color stability.


Keywords: 3D printing; polymers; titanium; nanostructures