ABSTRACT

Physicochemical and biological evaluation of 3D printed resin for interim restorations: effect of printing and post- cure protocols

The aim of this study was to analyze properties of 3D printing resins designed for interim restorations, subjected to distinct printing and post-curing protocols,performing in vitro physicochemical and biological characterizations. Standardized samples were prepared with two commercially available 3D printing resins. These samples were subjected to two different exposure times per layer (one set by the manufacturer and the other by a calibration process) using an MSLA technology printer. Subsequently, they were subjected to three different post-curing time (5, 10, and 15 minutes) within a UV light chamber. As a positive control, conventional acrylicresin samples were used. Printing accuracy was analyzed by measurement of x andy axis with a digital caliper (n=10). Surface topography was analyzed with a roughness tester (n=6). Color stability was evaluated with a spectrophotometer, with L*, a*, and b* coordinates used to calculate ΔE based on CIELab (n=6). For biological characterization, the samples were incubated for up to 72 hours in aculture medium to generate extracts. These extracts were subsequently applied at 24-hour intervals onto keratinocyte cells (NOK-Si). Cellular metabolism wasassessed at both 1 and 3 days (n=8) by MTT assay. The assessment of residual monomer leaching on extracts was conducted in spectrophotometer (n=8). Data were subjected to statistical analysis (two-way ANOVA/Tukey-Dunnett; α = 5%). Exposuretime played a more substantial role in influencing the accuracy of the specimens, particularly evident in the case of Prizma BioProv resin when calibrated, which demonstrated closer adherence to the established standard. Notably, the 3D resins exhibited lower surface roughness, particularly for extended post-curing durations, when compared to the control group. The color stability for Smart Dent Biotemp resin was linked to the post-curing time, with alterations observed for ΔE, ΔL, Δa, and Δbvariables. The exposure times per layer and post-curing durations did not have any discernible impact on the cell viability of the 3D printing resins when compared to the control group. The increase in post-curing time exhibited a direct relationship with thereduction in monomer release during the leaching test across all examined groups. Insummary, it can be concluded that the evaluated resins demonstrated

citocompatibility at all examined time points. However, variations in exposure times per layer and post-curing durations impacted the properties of roughness, leaching, accuracy, and color stability.

Keywords: 3D printing, resins, cytotoxicity.