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Influence of light curing and sample thickness on microhardness of a composite resin

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The aim of this in vitro study was to evaluate the influence of light-curing units and different sample thicknesses on the microhardness of a composite resin. Composite resin specimens were randomly prepared and assigned to nine experimental groups (n = 5): considering three light-curing units (conventional quartz tungsten halogen [QTH]: 550 mW/cm2 – 20 s; high irradiance QTH: 1160 mW/cm2 – 10 s; and light-emitting diode [LED]: 360 mW/cm2 – 40 s) and three sample thicknesses (0.5 mm, 1 mm, and 2 mm). All samples were polymerized with the light tip 8 mm away from the specimen. Knoop microhardness was then measured on the top and bottom surfaces of each sample. The top surfaces, with some exceptions, were almost similar; however, in relation to the bottom surfaces, statistical differences were found between curing units and thicknesses. In all experimental groups, the 0.5-mm-thick increments showed microhardness values statistically higher than those observed for 1- and -2-mm increments. The conventional and LED units showed higher hardness mean values and were statistically different from the high irradiance unit. In all experimental groups, microhardness mean values obtained for the top surface were higher than those observed for the bottom surface. In conclusion, higher levels of irradiance or thinner increments would help improve hybrid composite resin polymerization.

Keywords: photo-polymerization, light-curing distance, light-curing units, composite resin, composite thickness, microhardness

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