

# Pengaruh Jarak dan Durasi Penyinaran Terhadap Kekerasan Mikro dan Depth of Cure Resin Komposit Supra-Nano Universal Flow = Effect of Light-Curing Distance and Duration on the Microhardness and Depth of Cure of Supra-Nano Universal Flow Resin Composite

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## Abstrak

Latar Belakang: Material restorasi yang paling berkembang pesat sampai saat ini adalah resin komposit. Resin komposit yang beredar di pasaran dan menurun klaim pabrik memiliki sifat estetika yang baik, mudah dimanipulasi, serta dapat dipakai secara universal adalah Resin Komposit Supra-Nano Palfique Universal Flow. Suatu material restorasi harus mengalami polimerisasi yang adekuat agar menghasilkan sifat fisik, kimia, mekanik, dan biologis yang optimal. Sifat kekerasan mikro dan depth of cure material dapat menjadi indikator seberapa baik polimerisasi suatu material. Pada keadaan klinis, anatomi gigi dapat menghalangi sinar untuk berada tepat di atas permukaan restorasi sehingga jarak dan durasi penyinaran memengaruhi kekerasan mikro dan depth of cure resin komposit. Tujuan: Menganalisis pengaruh jarak dan durasi penyinaran terhadap kekerasan mikro dan depth of cure Resin Komposit Supra-Nano Palfique Universal Flow. Metode: Tiga puluh spesimen Resin Komposit Supra-Nano Palfique Universal Flow berbentuk silinder berdiameter 6 mm dan tinggi 2 mm dipersiapkan untuk penelitian ini. Spesimen terbagi menjadi 6 kelompok berdasarkan jarak penyinaran (0,3, dan 6 mm) dan durasi penyinaran (10 dan 15 detik) yang disinari light curing unit dengan iradiansi 1050 mW/cm<sup>2</sup>. Uji kekerasan dilakukan pada permukaan atas spesimen, dan diuji juga kekerasan pada permukaan bawah spesimen untuk menghitung depth of cure (DoC). DoC dihitung dengan menggunakan metode bottom/top hardness ratio (%). Data dianalisis menggunakan uji statistik One-way ANOVA dan Independent Sample T-test. Hasil: Kekerasan mikro dan DoC semakin tinggi pada jarak yang semakin dekat baik pada durasi 10 maupun 15 detik. Nilai kekerasan mikro dan DoC pada durasi penyinaran 15 detik lebih tinggi dibandingkan durasi penyinaran 10 detik pada jarak yang sama secara signifikan ( $p < 0.05$ ). DoC > 80% hanya didapatkan pada kelompok dengan jarak penyinaran 0 mm dengan durasi penyinaran 10 dan 15 detik yaitu  $81,44 \pm 0,02\%$  dan  $92,64 \pm 0,01\%$  secara berurutan, serta pada kelompok dengan jarak penyinaran 3 mm dan durasi penyinaran 15 detik, yaitu  $88,78 \pm 0,02\%$ . Kesimpulan: Semakin dekat jarak penyinaran dan semakin lama durasi penyinaran, maka kekerasan mikro dan DoC akan semakin tinggi.

.....Background: The most rapidly developing restoration material to date is composite resin. The composite resin on the market and according to manufacturer claims has good aesthetic properties, is easy to manipulate and can be used universally is Palfique Universal Flow Supra-Nano Composite Resin. A material restoration must have an adequate polymerization to produce optimal physical, chemical, mechanical, and biological properties. The microhardness and depth of cure properties of a material can be an indicators of how well a material is polymerized. In clinical situations, anatomical teeth can prevent light from being directly above the surface of the restoration so that the distance and duration of light-curing affect the microhardness and depth of cure of the composite resin. Objective: To analyze the effect of light-curing distance and duration on the microhardness and depth of cure of Supra-Nano Palfique Universal Flow Composite Resin. Methods: Thirty specimens of Palfique Universal Flow Supra-Nano Composite Resin in a

cylindrical shape with a diameter of 6 mm and a height of 2 mm were prepared for this study. Specimens were divided into 6 groups based on the light-curing distance (0,3, and 6 mm) and duration (10 and 15 seconds) which were exposed to a light curing unit with an irradiance of 1050 mW/cm<sup>2</sup>. The hardness test was on the top surface of the specimen, and hardness was also tested on the bottom surface of the specimen to calculate the depth of cure (DoC). DoC was calculated using the bottom/top hardness ratio (%) method. Data was analyzed statistically by One-way ANOVA and Independent Sample T-test. Results: Microhardness and DoC were higher at closer light-curing distances for both 10 and 15 seconds. Microhardness and DoC values at a light-curing duration of 15 seconds were significantly higher than at a duration of 10 seconds at the same distance ( $p < 0.05$ ). DoC > 80% was only obtained in the group with a light-curing distance of 0 mm with a duration of 10 and 15 seconds, that is  $81.44 \pm 0.02\%$  and  $92.64 \pm 0.01\%$  respectively, and  $88.78 \pm 0.02\%$  in the group with a light-curing distance of 3 mm and a duration of 15 seconds. Conclusion: The closer the light-curing distance and the longer the light-curing duration, the higher the microhardness and DoC.