

The effect of 35% Hydrogen Peroxide Application on the microhardness of a Microhybrid Composite Resin and a Resin-Modified Glass Ionomer Cement (RMGIC) = Pengaruh aplikasi Hidrogen Peroksida 35% terhadap kekerasan mikro pada resin Komposit Mikrohibrid dan Resin-Modified Glass Ionomer Cement (RMGIC)

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Abstrak

Latar Belakang: Bahan berbasis resin, termasuk resin komposit dan semen ionomer kaca yang dimodifikasi dengan resin (RMGIC), telah menjadi pilihan optimal untuk restorasi gigi, menawarkan kekuatan mekanis dan estetika. Namun, paparan bahan pemutih, khususnya hidrogen peroksida 35%, dapat mengganggu integritas permukaan material tersebut. Tujuan: Penelitian ini bertujuan untuk menyelidiki pengaruh bahan pemutih 35% terhadap kekerasan mikro RMGIC dan resin komposit mikrohibrid. Bahan dan Metode: Sebanyak 20 spesimen, resin komposit mikrohibrid (n=10) dan RMGIC (n=10), dipolimerisasi menggunakan unit curing LED selama 20 detik. Setelah polimerisasi, spesimen direndam dalam aquadest selama 24 jam dan kemudian disimpan dalam inkubator pada suhu 37°C. Semua spesimen dikeringkan, dan kekerasan mikro awalnya diukur menggunakan metode Vickers. Spesimen kemudian diberi perlakuan dengan agen pemutih hidrogen peroksida 35% dengan waktu paparan 15 menit per aplikasi, yang diulang sebanyak tiga siklus. Kekerasan mikro Vickers diukur pada lima titik berbeda pada setiap sampel di setiap interval pengujian, dimulai sebelum perlakuan pemutihan. Analisis statistik dilakukan menggunakan uji T-berpasangan dan uji T- independen untuk menilai dan membandingkan variasi kekerasan mikro antar kelompok. Nilai p kurang dari 0,05 dianggap signifikan secara statistik. Hasil: Resin komposit mikrohibrid menunjukkan nilai kekerasan mikro yang lebih tinggi sebelum pemutihan dibandingkan RMGIC. Setelah paparan agen pemutih hidrogen peroksida 35%, perubahan kekerasan mikro pada spesimen resin komposit mikrohibrid dan RMGIC diamati. Perbedaan nilai kekerasan mikro sebelum dan sesudah pemutihan signifikan secara statistik (p=0,000). Resin komposit mikrohibrid menunjukkan penurunan kekerasan mikro yang lebih besar dibandingkan RMGIC (p=0,000). Kesimpulan: Aplikasi hidrogen peroksida 35% mengakibatkan penurunan kekerasan mikro pada resin komposit mikrohibrid dan RMGIC, dengan penurunan yang lebih signifikan terjadi pada resin komposit mikrohibrid.

.....Background : Resin based materials, including composite resins and resin-modified glass ionomer cements (RMGIC), have emerged as an optimal choice for dental restorations, offering both mechanical strength and aesthetic properties. However, exposure to bleaching agents, particularly 35%hydrogen peroxide , can compromise the material's surface integrity. Objective : This study aims to investigate the effect of 35% bleaching agents affect the microhardness of RMGIC and microhybrid resin composites. Materials and method : A total of 20 specimens, microhybrid composite resins (n=10) and RMGIC (n=10), were polymerized using LED curing unit for 20 seconds. Following polymerization, the specimens were immersed in aquadest for 24 hours and subsequently stored in an incubator for at 37°C. All of the specimen were dried and their baseline Vickers microhardness was measured. The specimens were then subjected to 35% hydrogen peroxide bleaching agent with a 15-minute exposure per application, repeated for three cycles. Vickers microhardness was measured at five distinct points on each sample at each testing interval,

starting before the bleaching treatment. Statistical analysis was performed using paired T-tests and independent T-tests to assess and compare the variations in microhardness across the groups. A p-value of less than 0.05 was considered statistically significant. Results : The microhybrid composite resins exhibited higher microhardness values prior to bleaching compared to RMGIC. Following exposure to 35% hydrogen peroxide bleaching agent, changes in the microhardness of both microhybrid composite resin and RMGIC specimens were observed. The differences in the microhardness values before and after bleaching, were statistically significant ($p=0.000$). Microhybrid composite resin shows a greater reduction of microhardness compared to RMGIC ($p=0.000$). Conclusion : The application of 35% hydrogen peroxide results in a reduction in microhardness for both microhybrid composite resin and RMGIC, with a more significant decrease observed in microhybrid composite resin.