

Pengaruh pH Saliva Buatan terhadap Kekerasan Resin Komposit Alkasit Polimerisasi Kimia dan Cahaya = Effect of Artificial Saliva pH on Microhardness of Self-cured and Dual-cured Alkasite Composite Resin

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Abstrak

ABSTRAK

Dalam penggunaannya di rongga mulut, resin komposit dapat mengalami degradasi oleh asam, terutama pada pasien dengan resiko karies tinggi. Resin komposit alkasit merupakan material dual-cured yang berbasis UDMA dan mampu melepaskan ion fluor, kalsium, dan hidroksida. Adanya ion hidroksida yang dilepaskan diketahui dapat menetralkan suasana asam. Namun, belum diketahui bagaimana pengaruh pH saliva buatan terutama pH kristis hidroksiapatit dan fluoroapatit terhadap sifat kekerasan resin komposit alkasit. Penelitian ini dilakukan untuk melihat pengaruh pH saliva buatan terhadap kekerasan resin komposit alkasit polimerisasi kimia dan cahaya. Penelitian berupa eksperimental laboratorik dengan menggunakan masing-masing 48 spesimen resin komposit alkasit (Cention-N, Ivoclar-Vivadent, Liechtenstein) polimerisasi kimia dan cahaya. Spesimen berbentuk silindris dengan diameter 6 mm dan tinggi 2 mm yang dibagi menjadi 16 kelompok perendaman. Perendaman dilakukan pada pH saliva buatan 4,5 dan 5,5 dengan lama perendaman 1, 3, 5, dan 7 hari di dalam inkubator dengan suhu 37°C. Uji kekerasan menggunakan Knoop Microhardness Tester (HNV-G Shimadzu). Hasil penelitian menunjukkan adanya penurunan kekerasan pada resin komposit alkasit polimerisasi kimia dan cahaya setelah dilakukan perendaman selama 1, 3, 5, dan 7 hari dalam saliva buatan dengan pH 4,5 dan 5,5. Nilai kekerasan tertinggi terlihat pada resin komposit alkasit polimerisasi cahaya setelah perendaman 1 hari pada pH saliva buatan 5,5 yaitu $58,41 \pm 0,23$ KHN. Sedangkan nilai kekerasan terendah terlihat pada resin komposit alkasit polimerisasi kimia setelah perendaman 7 hari pada pH saliva buatan 4,5 yaitu $47,38 \pm 0,49$ KHN. Berdasarkan uji statistik One-way Anova terdapat perbedaan bermakna ($p < 0,05$) antar kelompok lama perendaman pada pH saliva buatan 4,5 dan 5,5. Hasil uji statistik Independent T-test menunjukkan terdapat perbedaan bermakna ($p < 0,05$) antar kelompok pH saliva buatan dan antar kelompok metode polimerisasi. Dapat disimpulkan bahwa terdapat penurunan nilai kekerasan resin komposit alkasit seiring dengan semakin rendahnya pH saliva buatan dan semakin lamanya perendaman dengan penurunan terbesar pada perendaman 1 hari pertama.

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ABSTRACT

In its application in the oral cavity, composite resins can be degraded by acids, especially in patients with a high caries risk. Alkasite composite resin is a dual-cured material based on UDMA and capable of releasing fluoride, calcium, and hydroxide ions. The presence of hydroxide ion which released to its environment can neutralize the acidic condition. However, it has not yet determined how saliva pH, especially the critical saliva pH for hydroxyapatite and fluoroapatite, affects the hardness properties of alkasite composite resins. The aim of this study was to determine the effect of artificial saliva pH on the hardness of self-cured and dual-cured alkasite composite resin. This laboratory study used 48 cylindrical-shaped specimens with 6 mm in diameter and 2 mm in thickness of alkasite composite resin specimens (Cention-N, Ivoclar-Vivadent,

Liechtenstein) for each polymerization methods. The specimens were divided into 16 groups for immersion in artificial saliva pH 4.5 and 5.5 and then stored in an incubator at 37°C for the next 1, 3, 5, 7 days. The hardness test was performed using a Knoop Microhardness Tester (HMV-G Shimadzu). The results showed that the hardness of self-cured and dual-cured alkasite composite resins decreased after immersion. The highest hardness value was seen in dual-cured alkasite composite resin after 1 day immersion in artificial saliva pH of 5.5 (58.41 ± 0.23 KHN). While the lowest hardness value was seen in the self-cured alkasite composite resin after 7 days immersion in artificial saliva pH 4.5 (47.38 ± 0.49 KHN). Based on the One-way Anova statistical test, there were significant differences ($p < 0.05$) between the different immersion time groups in each artificial saliva pH. The results of the Independent T-test statistical test showed that there were significant differences ($p < 0.05$) between the artificial saliva pH groups and between polymerization methods groups. It was concluded that there was a decrease in the hardness of alkasite composite resin along with the lower pH of artificial saliva and the increasing immersion time. The greatest decrease occurred in the first day of immersion.