Pengaruh Modifikasi Semen Ionomer Kaca Menggunakan Carboxymethyl Chitosan terhadap Remineralisasi Dentin = Effect of Modification of Glass Ionomer Cement Using Carboxymethyl Chitosan on Dentine Remineralization

Grace Riska, author

Abstrak

Latar Belakang: Salah satu material remineralisasi yang banyak digunakan adalah semen ionomer kaca (SIK). Namun dentin terdemineralisasi sesudah aplikasi SIK memiliki sifat mekanis yang berbeda dan lebih rendah daripada dentin normal karena remineralisasi yang terjadi adalah remineralisasi interfibril. Material carboxymethyl chitosan (CMC) bertindak sebagai analog protein nonkolagen yang mampu menstabilisasi nanocluster amorphous calcium phosphate (ACP) dalam proses remineralisasi intrafibril. Tujuan: Mengetahui pengaruh aplikasi modifikasi SIK-CMC5% dan SIK-CMC10% pada dentin terdemineralisasi terhadap kekerasan mikro, fasa mineral dan derajat kristalinitas dentin. Metode: Material SIK dilakukan pencampuran dengan CMC pada rasio 5% dan 10% menghasilkan SIK-CMC5% dan SIK-CMC10%. Kemudian, demineralisasi pada kavitas dentin terdemineralisasi dilakukan dengan aplikasi material SIK, SIK-CMC5% dan SIK-CMC10%. Akar gigi direndam dalam cairan phosphate-buffered saline selama 14 hari. Remineralisasi dentin dievaluasi dari kekerasan mikro melalui uji Vickers dan penilaian fasa mineral dan derajat kristalinitas dentin dari uji X-Ray Diffraction (XRD). Hasil: Kekerasan mikro dentin pada kelompok SIK-CMC5% dan SIK-CMC10% meningkat dibandingkan pada kelompok SIK. Pembentukan kristal hidroksiapatit ditemukan pada sampel SIK dan SIK-CMC, dengan derajat kristalinitas tertinggi pada sampel SIK-CMC10%. Kesimpulan: Semen Ionomer Kaca modifikasi Carboxymethyl Chitosan 10% lebih efektif dalam meningkatkan nilai kekerasan mikro dan mempengaruhi pembentukan fasa mineral kristal hidroksiapatit dan derajat kristalinitas.

.....Background: One of the widely used remineralization materials is glass ionomer cement (GIC). However, demineralized dentine after GIC application has different and lower mechanical properties than normal dentin because the remineralization that occurs is interfibril remineralization. Carboxymethyl chitosan (CMC) acts as noncollagenous protein analog that can stabilize amorphous calcium phosphate (ACP) nanoclusters in intrafibril remineralization. Objective: To determine the effect of the application of modified GIC-CMC5% and GIC-CMC10% on the microhardness, mineral phase and degree of crystallinity of demineralized dentin. Methods: GIC material was mixed with CMC at ratio 5% and 10% to produce GIC-CMC5% and GIC-CMC10%. Remineralization of demineralized dentin cavity was carried out by applying GIC, GIC-CMC5% and GIC-CMC10% for 14 days. Remineralization was evaluated from microhardness value through Vickers test and assessment of mineral phase and degree of dentin crystallinity from X-Ray Diffraction (XRD) test. Results: Dentin microhardness in the GIC-CMC5% and GIC-CMC10% was increasing compared to the CIC group. The formation of hydroxyapatite crystals was found in the GIC and GIC-CMC samples with the highest degree of crystallinity in the GIC-CMC10% sample. Conclusion: Modified Glass Ionomer Cement with 10% Carboxymethyl Chitosan is more effective in increasing the microhardness value and affecting the formation of the hydroxyapatite crystalline mineral phase and the degree of crystallinity.