

INTISARI

FABRIKASI DAN KARAKTERISASI GEL HIDROKSIAPATIT-KERANG MUTIARA (*PINCTADA MAXIMA*)/SIWAK (*SALVADORA PERSICA*) SEBAGAI AGEN REMINERALISASI ENAMEL GIGI

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Penelitian ini bertujuan untuk membuat komposit gel dan mengkarakterisasi gel hidroksiapatit (HA) dari kerang mutiara dengan siwak sebagai agen remineralisasi enamel gigi. HA disintesis dari kerang mutiara menggunakan metode presipitasi dengan variasi optimal untuk mendapatkan hasil terbaik. Hasil HA digunakan untuk fabrikasi komposit gel. Pembuatan gel basis menggunakan Na-CMC, Guar-Gum, dan gliserin. Komposit gel disintesis dari masing-masing HA dengan konsentrasi 5, 10, 15 dan 20 %wt ditambahkan siwak 20 wt%. Komposit gel hasil fabrikasi dikarakterisasi menggunakan *Scanning Electron Microscope* (SEM), *Fourier Transform Infrared* (FTIR) dan *X-Ray Diffractometer* (XRD) serta dilakukan uji in vitro melalui uji antibakteri terhadap zona hambat bakteri *Streptococcus mutans*, *Streptococcus sanguinis* dan *Lactobacillus acidophilus*. Uji antibakteri bertujuan untuk mengetahui zona hambat gel terhadap bakteri penyebab karies gigi. Morfologi gel semakin padat seiring dengan bertambahnya konsentrasi HA dan terdapat gumpalan-gumpalan kecil yang tersebar merata. Ukuran rata-rata butir partikel HA dalam gel antara 0,15 – 0,55 μm . Spektrum FTIR menunjukkan pola gugus fungsi HA dengan dominasi gel. Ukuran kristal gel HA-siwak dengan variasi konsentrasi HA berturut-turut adalah (46 ± 1) , (40 ± 1) , (43 ± 1) , dan (39 ± 1) nm. Hasil uji antibakteri gel HA-siwak menunjukkan adanya zona hambat bakteri dengan diameter zona hambat *S. mutans* $(15,9 \pm 0,2)$ mm, *S. sanguinis* $(15,4 \pm 0,2)$ mm dan *L. acidophilus* $(15,1 \pm 0,4)$ mm. Hasil uji fisikokimia dan uji antibakteri menegaskan bahwa biokomposit gel HA-siwak berpotensi sebagai agen remineralisasi enamel gigi.

Kata kunci: hidroksiapatit, siwak, gel, remineralisasi.

ABSTRACT

FABRICATION AND CHARACTERIZATION OF HYDROXYAPATITE-PEARL SHELLS (PINCTADA MAXIMA)/MISWAK (SALVADORA PERSICA) GEL AS DENTAL ENAMEL REMINERALIZATION AGENT

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This study aims to make composite gel and characterize hydroxyapatite (HA) gel from pearl shells with miswak as a tooth enamel remineralization agent. HA was synthesized from pearl shells using a precipitation method with optimal variations for the best results. The HA was used to fabricate gel composites. The composition of base gel is Na-CMC, Guar-Gum, and glycerin. Composite gels were synthesized from each HA with concentrations of 5, 10, 15 and 20 wt% added with 20 wt% miswak. The fabricated gel composite was characterized using a Scanning Electron Microscope (SEM), Fourier Transform Infrared (FTIR) and X-ray diffractometer (XRD) and carried out in vitro tests through antibacterial tests against the inhibitory power of *Streptococcus mutans*, *Streptococcus sanguinis* and *Lactobacillus acidophilus* bacteria. The antibacterial test aims to determine the gel's inhibitory power against bacteria that cause dental caries. The gel morphology becomes denser as the HA concentration increases, and there are small clumps that are evenly distributed. The average grain size of HA particles in the gel is between 0.15 – 0.55 μm . The FTIR spectrum shows a pattern of HA functional groups with a predominance of gel. The crystal sizes of HA-miswak gel with varying HA concentrations were (46 ± 1) , (40 ± 1) , (43 ± 1) , and (39 ± 1) nm, respectively. The antibacterial test results of the HA-miswak gel showed that there was a bacterial inhibition zone with the diameter of the inhibition zone for *S. mutans* (15.9 ± 0.2) mm, *S. sanguinis* (15.4 ± 0.2) mm and *L. acidophilus* (15.1 ± 0.4) mm. The results of physicochemical and antibacterial tests confirmed that the HA-miswak gel biocomposite has the potential as a tooth enamel remineralization agent.

Keywords: hidroxyapatite, miswak, gel, remineralization.