

INTISARI

Latar Belakang, pendekatan minimal invasif untuk terapi *white spot lesion* diperlukan agen remineralisasi. Pengembangan biomimetik remineralisasi dengan menggunakan molekul organik peptida penyusun protein pada gigi diharapkan menyerupai proses mineralisasi hidroksiapatit di email gigi. Penelitian merancang peptida QP3VH yang berasal dari turunan amelogenin dan gabungan dari *Antimicrobial peptides* (AMPs), yang selanjutnya di kombinasikan dengan kitosan sebagai zat pembawa. Tujuan dari penelitian ini adalah untuk mengetahui potensi kombinasi peptida QP3VH dengan kitosan sebagai agen remineralisasi dan antibakteri.

Metode Penelitian, tahap penelitian terdiri dari 3 tahap. Tahap 1, menguji kemampuan mengikat peptida QP3VH pada HA, dilakukan dengan mengukur adsorpsi sesuai model isoterm langmuir, konsentrasi adsorpsi jenuh dan kemampuan QP3VH mengikat pada permukaan email yang terdemineralisasi. Tahap 2, menguji daya antibakteri QP3VH dan kitosan pada bakteri *S.mutans* dengan dihitung jumlah koloni bakteri menggunakan metode dilusi padat. Tahap 3, menguji kemampuan remineralisasi QP3VH dan kitosan dilakukan pada gigi *desidui anterior* yang sebelumnya lakukan demineralisasi menggunakan etsa 37%. Selanjutnya diaplikasikan bahan-bahan agen remineralisasi yaitu QP3VH, QP3VH+kitosan dan *saline distilled water* (SDW). Bahan diaplikasikan 2 kali selama 5 menit setiap hari, dalam siklus pH selama tujuh hari kemudian diamati mikroporositas permukaan email, rasio Ca/P menggunakan SEM-EDX dan kekerasan permukaan email dengan *Vickers Microhardness test*.

Hasil pada tahap 1, menunjukkan QP3VH mempunyai kemampuan mengikat pada HA. Tahap 2 uji Anava dua arah menunjukkan terdapat perbedaan signifikan secara statistik antar kelompok ($p<0,05$) dan dilakukan uji *Post Hoc* menunjukkan terdapat perbedaan signifikan antar kelompok. Tahap 3, dengan uji Anava satu arah, menunjukkan terdapat perbedaan signifikan secara statistik antar kelompok ($p<0,05$) dan uji *Post Hoc* menunjukkan terdapat perbedaan signifikan antar kelompok.

Kesimpulan, kombinasi QP3VH dan kitosan dengan kemampuan antibakteri dan remineralisasi berpotensi sebagai agen antikaries untuk perawatan preventif lesi awal karies.

Kata Kunci : Remineralisasi, *White spot lesion*, QP3VH, Kitosan, Antibakteri

ABSTRACT

Background, a minimally invasive approach to treat white spot lesions requires remineralization agents. The development of biomimetic remineralization using organic molecules of protein constituent peptides in teeth is expected to resemble the mineralization process of hydroxyapatite in tooth enamel. The research designed QP3VH peptide derived from amelogenin derivatives and a combination of Antimicrobial peptides (AMPs), which was then combined with chitosan as a carrier. The purpose of this study was to determine the potential of the combination of QP3VH peptides with chitosan as a remineralizing and antibacterial agent.

Research method, the research consists of 3 stages. Stage 1, testing the binding ability of QP3VH peptide on HA, was carried out by measuring adsorption according to the Langmuir isotherm model, saturated adsorption concentration and the ability of QP3VH to bind on the surface of demineralized enamel. Stage 2, testing the antibacterial power of QP3VH and chitosan on *S. mutans* bacteria by counting the number of bacterial colonies using the solid dilution method. Stage 3, testing the remineralization ability of QP3VH and chitosan was carried out on anterior deciduous teeth that were previously demineralized using 37% etching. Next, remineralizing agents were applied, namely QP3VH, QP3VH + chitosan, and saline distilled water (SDW). The materials were applied twice for 5 minutes every day, in a pH cycle for seven days, and then observed for enamel surface microporosity, Ca/P ratio using SEM-EDX, and enamel surface hardness with Vickers Microhardness test.

The results, in stage 1 showed that QP3VH can bind to HA. Stage 2, the two-way ANOVA test showed there were statistically significant differences between groups ($p < 0.05$) and the Post Hoc test showed there were significant differences between groups. Stage 3, with a one-way ANOVA test, showed that there were statistically significant differences between groups ($p < 0.05$), and the Post Hoc test showed that there were significant differences between groups.

Conclusion, the combination of QP3VH and chitosan with antibacterial and remineralizing abilities has the potential as an anticaries agent for the preventive treatment of early caries lesions.

Keywords: Remineralization, White spot lesion, QP3VH, Chitosan, Antibacterial