

INTISARI

Relapse pascaperawatan ortodonti disebabkan oleh proses *remodeling* tulang yang belum stabil. Nanohidrogel *silk sericin* – kitosan merupakan biomaterial potensial untuk mendukung remodeling tulang melalui sifat antiinflamasi, antioksidan, dan stimulasi pertumbuhan sel. Osteoprotegerin (OPG) yang dihasilkan oleh osteoblas menjadi indikator aktivitas *remodeling* tulang. Penelitian ini bertujuan untuk mengetahui pengaruh aplikasi nanohidrogel *silk sericin*–kitosan terhadap kadar OPG pada tikus setelah fase stabilisasi ortodonti.

Tiga puluh tikus dibagi menjadi 2 kelompok (kontrol dan perlakuan) dan dibagi ke dalam 5 kelompok hari ke-0, 3, 7, 14, dan 21. Pemasangan *closed coil spring* dan *ligature wire* pada gigi incisivus dan molar pertama rahang atas kanan tikus dilakukan untuk menggerakkan gigi molar pertama ke mesial dengan gaya sebesar 30 gf selama 7 hari. Stabilisasi dengan *block out* pada *closed coil spring* dan aplikasi nanohidrogel *silk sericin* – kitosan selama 14 hari sebanyak 1x sehari. Peranti ortodonti dilepas dan gigi molar mulai *relapse*. Pengambilan cairan sulkus gingiva pada hari ke-0, 3, 7, 14, dan 21 pascastabilisasi untuk mengalisa kadar OPG dengan menggunakan ELISA. Data dianalisis menggunakan *two-way ANOVA* dilanjutkan *Tukey's post-hoc tests* ($p < 0,05$)

Hasil penelitian menunjukkan kadar OPG lebih tinggi pada kelompok aplikasi *silk sericin* – kitosan hari ke-0, 3, 7, 14, dan 21 dibandingkan dengan kelompok kontrol pascastabilisasi ($p < 0,05$). Kadar OPG tertinggi terlihat pada kelompok *silk sericin* – kitosan hari ke-14 dan stabil sampai hari ke-21. Hasil penelitian disimpulkan nanohidrogel *silk sericin* – kitosan dapat meningkatkan kadar OPG pascastabilisasi ortodonti.

Kata kunci: *relapse*, osteoblas, *Silk sericin*, kitosan, Osteoprotegerin

ABSTRACT

Orthodontic relapse following treatment is primarily caused by unstable bone remodeling. Silk sericin–chitosan nanohydrogel is a promising biomaterial to support the bone remodeling process due to its anti-inflammatory, antioxidant, and ability to stimulate cell growth. Osteoprotegerin (OPG) produced by osteoblasts, serves as a key biomarker for bone remodeling activity. This study aimed to evaluate the effect of silk sericin–chitosan nanohydrogel application on OPG levels in rats following the orthodontic stabilization phase.

Thirty rats were divided into two groups (control and treatment) and subdivided based on observation days: day 0, 3, 7, 14, and 21. Orthodontic tooth movement was induced by placing a closed-coil spring and ligature wire between the maxillary right first molars and incisors, applying a 30-gf force for 7 days. Stabilization was achieved using block-out on the coil spring, and the treatment group received daily applications of silk sericin–chitosan nanohydrogel for 14 days. The orthodontic appliance was then removed to initiate the relapse phase. Gingival crevicular fluid was collected on days 0, 3, 7, 14, and 21 post-stabilization, and OPG levels were measured using ELISA. Data were analyzed using two-way ANOVA followed by Tukey's post hoc test ($p < 0.05$).

The results showed significantly higher OPG levels in the treatment group at all time points compared to the control group ($p < 0.05$). The highest OPG expression was observed on day 14 in the treatment group and remained stable through day 21. These findings indicate that silk sericin–chitosan nanohydrogel effectively enhances OPG expression following orthodontic stabilization.

Keywords: relapse, osteoblast, silk sericin, chitosan, osteoprotegerin