

INTISARI

Remodeling tulang merupakan kunci sukses dalam perawatan ortodonti terutama untuk mencegah *relapse*. Proses resorpsi tulang dalam remodeling dikaitkan dengan aktivitas osteoklas. *Hydrogel Carbonate hydroxyapatite* (CHA) merupakan biomaterial ideal yang dapat menghambat resorpsi tulang. *Tartrate-resistant acid phosphatase* (TRAP) dihasilkan oleh osteoklas saat resorpsi, sehingga TRAP biomarker yang tepat untuk mengetahui aktivitas osteoklas. Penelitian ini bertujuan untuk mengetahui pengaruh dari aplikasi *hydrogel* CHA terhadap kadar TRAP paska stabilisasi ortodonti tikus.

Tiga puluh dua tikus dibagi menjadi 2 kelompok (kontrol dan CHA) dan dibagi 4 kelompok hari ke-0, 1, 7 dan 14. Pemasangan *closed-coil spring* dan *ligature wire* pada gigi incisivus dan molar pertama 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 *hydrogel* CHA selama 7 hari sebanyak 1x sehari. Peranti ortodonti dilepas dan gigi molar mulai *relapse*. Pengambilan GCF pada hari ke- 0, 1, 7, dan 14 paska stabilisasi untuk menganalisa kadar TRAP dengan menggunakan ELISA. Data dianalisis menggunakan ANAVA dua jalur dilanjutkan *Tukey's post-hoc test* ($P < 0,05$).

Hasil penelitian menunjukkan kadar TRAP lebih rendah pada kelompok CHA hari ke-0, 1, 7 dan 14 dibandingkan dengan kelompok kontrol paska stabilisasi ($P < 0,05$). Kadar TRAP terendah terdapat pada kelompok CHA hari ke 14, kadar TRAP hari ke 1 lebih tinggi dibandingkan dengan hari ke 0, dan hari ke 7 lebih rendah dibandingkan hari ke 1 dan semakin rendah pada hari ke 14. Hasil penelitian disimpulkan *hydrogel* CHA dapat menurunkan kadar TRAP paska stabilisasi ortodonti.

Kata Kunci : *relapse*, osteoklas, *Hydrogel Carbonate hydroxyapatite*, *Tartrate-resistant acid phosphatase*

ABSTRACT

Bone remodelling is the key to success in orthodontic treatment, especially to prevent relapse. The process of bone resorption in remodelling is associated with osteoclast activity. Hydrogel *Carbonate hydroxyapatite* (CHA) is an ideal biomaterial that can inhibit bone resorption. *Tartrate-resistant acid phosphatase* (TRAP) is produced by osteoclasts during resorption, so TRAP is an appropriate biomarker for determining osteoclast activity. This research aims to determine the effect of CHA hydrogel application on TRAP levels after orthodontic stabilization in rats (*Rattus norvegicus*).

Thirty-two rats were divided into 2 groups (control and CHA) and divided into 4 groups on days 0, 1, 7 and 14. Installation of a closed-coil spring and ligature wire on the incisors and first molars of rats (*Rattus norvegicus*) moved the first molars to the mesial with a force of 30 gf for 7 days, stabilization by blocking out the closed-coil spring and application of CHA hydrogel for 7 days once a day. The orthodontic appliance was removed and the molars began to relapse. GCF was taken on days 0, 1, 7, and 14 after stabilization to analyze TRAP levels using ELISA. Data were analyzed using two-way ANOVA followed by *Tukey's post-hoc* test ($P < 0.05$).

The results showed that TRAP levels were lower in the CHA group on days 0, 1, 7 and 14 compared to the post-stabilization control group ($P < 0.05$). The lowest TRAP levels were in the CHA group on day 14, TRAP levels on day 1 were higher compared to day 0, and day 7 were lower than day 1 and were lower on day 14. The results of the study concluded that CHA hydrogel could reduce TRAP levels after orthodontic stabilization.

Keyword : relapse, osteoclast, Hydrogel *Carbonate hydroxyapatite*, *Tartrate-resistant acid phosphatase*