

INTISARI

Percepatan pergerakan gigi ortodonti perlu memperhatikan keseimbangan remodeling tulang yaitu proses resorpsi osteoklastik dan proses aposisi osteoblastik. Fotobiomodulasi terbukti meningkatkan pergerakan gigi ortodonti dimana sebagian besar penelitian terdahulu menggunakan durasi terapi lama serta belum menjelaskan tentang keseimbangan remodeling tulang. Penelitian ini bertujuan mempelajari pengaruh durasi dan waktu pengamatan fotobiomodulasi LED sinar biru terhadap jumlah sel osteoklas sisi tertekan dan sel osteoblas sisi tertarik jaringan periodontal tikus wistar.

Empat puluh delapan tikus wistar (*Rattus novergicus*) jantan berusia 3-4 bulan berat badan 150-300 gram dibagi menjadi empat kelompok (kontrol, kelompok paparan sinar 25 detik, kelompok paparan sinar 30 detik, dan kelompok paparan sinar 35 detik). Gaya ortodonti 35 gram diaplikasikan pada inter insisivus mandibula menggunakan open coil spring. Kelompok perlakuan diberi pemaparan sinar dengan intensitas 1000 mW/cm^2 setiap hari pada area *center of resistance* akar insisivus mandibula hingga hari ke-14. Penghitungan sel osteoklas dan osteoblas dilakukan pada hari ke- 0, 3, 7 dan 14 sebanyak dua kali selanjutnya dibandingkan dengan uji cohen's Kappa kemudian dianalisis dengan uji anova dua jalur dan post hoc LSD.

Hasil penelitian menunjukkan peningkatan signifikan jumlah sel osteoklas pada sisi tertekan dan sel osteoblas pada sisi tertarik ($p < 0,05$) dengan urutan dari terendah berturut turut pada kelompok kontrol, pemaparan LED 25, 35 dan 30 detik. Kesimpulan penelitian adalah pemaparan LED sinar biru selama 25, 30 dan 35 detik meningkatkan jumlah osteoklas di sisi tertekan dan jumlah osteoblas di sisi tertarik jaringan periodontal tikus (*Rattus novergicus*) pada pergerakan gigi ortodonti fase aktif dengan durasi optimal 30 detik.

Kata kunci: LED sinar biru, osteoklas, osteoblas, pergerakan gigi ortodonti

ABSTRACT

Acceleration of tooth movement during orthodontic treatment must be considerate bone remodeling balance. LED photobiomodulation has been shown to accelerate orthodontic tooth movement when the most study using long irradiation duration and the effects on bone remodeling has not yet been known. This study aims to analyze the effect of photobiomodulation of blue light on the number of osteoclast cells on the pressured side and osteoblasts on the tension side of the periodontal tissue of wistar rats.

Forty-eight male wistar rats (*Rattus novergicus*) aged 3-4 months with a bodyweight of 150-300 grams were divided into four groups (control, 25-second ray exposure, 30-second ray exposure, and 35-second ray exposure). The 35gram orthodontic force was applied to the inter incisor of the mandible using the open coil spring. The treatment group was given exposure to light with an intensity of 1000 mW / cm² every day in the area of the center of resistance of the mandibular incisive root until the 14th day. The calculation of osteoclasts and osteoblasts was carried out on days 0, 3, 7, and 14 twice by anatomic pathologists who were then compared with the cohen's Kappa test.

Two-way Anova statistical analysis and post hoc LSD test showed a significant increase in the number of osteoclast cells on the pressured side and osteoblasts on the tension side ($p < 0.05$) in order from lowest to highest respectively on control group, LED exposure 25, 35 and 30 seconds. The conclusion of the study was the exposure of blue light LEDs for 25, 30 and 35 seconds increased the number of osteoclasts on the pressured side and osteoblasts on the tension side of the periodontal tissue of the mouse (*Rattus novergicus*) in the orthodontic treatment of the active phase with optimal duration of 30 seconds.

Keywords: blue LED, osteoclast, osteoblast, orthodontic treatment