

INTISARI

Pengembangan percepatan pergerakan gigi secara ortodonti non invasif dapat mengubah aktivitas seluler. Sinar *Blue-Light Emitting Diode (LED)* merupakan sinar *LED* dengan panjang gelombang pendek 400-490 nm bersifat *photobiomodulation* membantu produksi ATP oleh sel mitokondria. Produksi ATP yang tinggi membantu sel untuk *turnover* lebih efisien dalam proses *remodeling* dan mempercepat pergerakan gigi secara ortodonti. Penelitian ini bertujuan untuk mempelajari pengaruh waktu pemaparan sinar *Blue LED* terhadap percepatan pergerakan gigi secara ortodonti.

Dua puluh empat ekor marmut (*Cavia cobaya*) jantan berusia 3-4 bulan dengan berat badan antara 300-500 gram dibagi menjadi empat kelompok (kontrol, kelompok I pemaparan sinar 25 detik, kelompok II pemaparan sinar 30 detik, dan kelompok III pemaparan sinar 35 detik). Gaya ortodonti 35gram diaplikasikan pada inter insisivus mandibula menggunakan open coil spring. Pada kelompok perlakuan diberi pemaparan sinar dengan intensitas 1000 mW/cm² setiap hari pada area *center of resistance* akar insisivus mandibula hingga hari ke-7. Pengukuran pergerakan gigi pada hari ke- 0, 1, 3, dan 7 menggunakan *sliding caliper*. Analisis statistik menggunakan uji Anova dua jalur dan uji *post hoc LSD* dengan $p < 0,05$.

Hasil uji Anova dua jalur diperoleh nilai $p < 0,05$ menunjukkan perbedaan jarak pergerakan gigi yang signifikan antar kelompok, antar hari pengamatan, dan interaksi antara kelompok dengan hari pengamatan. Pemaparan sinar *blue light emitting diode* 25 detik, 30 detik, dan 35 detik mempercepat pergerakan gigi secara ortodonti pada marmut. Waktu pemaparan sinar *blue light emitting diode* selama 30 detik paling optimal mempercepat pergerakan gigi secara ortodonti dibandingkan 25 detik dan 35 detik.

Kata kunci : pergerakan gigi ortodonti, percepatan pergerakan gigi ortodonti, LED biru.

ABSTRACT

The emerging method of non invasive accelerated orthodontic tooth movement (OTM) now has been seen as viable alternative to surgery. Blue Light Emitting Diode (LED) is a curing light LED which has a wavelength of 400-490 nm. LED is a non invasive method which has photobiomodulation. Photobiomodulation can have a positive effect on ATP production by mitochondria cell. During the orthodontic tooth movement phase, high availability of ATP can help the cell to have a more efficient turnover in the modeling process dan have a faster tooth movement. This research is attempt to study the relation between time of radiated blue LED in orthodontic tooth movement.

*Twenty four male *Cavia cobaya* aged between 3-4 month, weighted 300-500 grams were divided into four groups (control group, group I with 25 seconds exposure time, group II with 30 seconds exposure time, and group III with 35 seconds exposure time). Orthodontic force 35 grams was applied on the inter incisivus mandible with an open coil spring. The applied group was radiated daily with 1000 mW/cm² LED for 7 days on the center of resistance root area incisivus mandible. The OTM was measured on day 0, 1, 3, and 7 using sliding caliper. Statistic analysis method choosen for this research was two way Anova and uji post hoc LSD with $p < 0.05$.*

Two way anova analysis show a significant difference on tooth movement between group, the observation days, and there are interaction between group and observation days ($p < 0,05$). The exposure duration of blue light emitting diode (25 second, 30 second, and 35 second) have a positive impact on the subject orthodontic tooth movement. From this research we conclude that 30 second of blue light emitting diode exposure have the most significant impact rather than shorter period (25 second) or longer period (35 second).

Keywords: orthodontic tooth movement, accelerated orthodontic, blue LED