

IRAWAN PANDU BUDITOMO. 091515053002, 2019. Diode Laser Photodynamic Therapy with *Doxycycline* Addition for Immunity Enhancement in Periodontitis Rat. Thesis supervised by Dr. Suryani Dyah Astuti, M.Si. and Prof. Dr. Ernie Maduratna S., drg.,M.Kes.,Sp.Perio(K), Master of Biomedical Engineering Program, Sekolah Pascasarjana, Airlangga University.

ABSTRACT

The aim of this study is to prove that the photodynamic therapy using combination of diode laser and antibiotic can enhance the immune system on periodontitis rats. In addition, we compared the periodontitis rats immune systems on four days of given therapy. In order to periodontitis modelling in rat, we injected *Porphyromonas gingivalis* (*P.g.*) in first molar region with 14 days period time. The histopathological measuring showed that the periodontitis rats is characterized by higher macrophage ($7,67 \pm 0,58 - 10,00 \pm 2,00$ cells), lymphocytes ($5,00 \pm 1,00 - 5,67 \pm 1,53$ cells), and lower fibroblast ($18,33 \pm 2,31 - 21,67 \pm 3,21$ cells) which were followed by the increased alveolar bone destruction since the first day resulting increased distance between cemento-enamel junction and alveolar bone (CEJ-AV) on last day observation ($893,61 \pm 316,78 - 1123,23 \pm 170,60$ μm). Diode laser is used as monochromatic light source which harmless with low output power using 8 J/cm^2 energy density. Doxycycline can be used as photosensitizer because of the appropriately absorbance spectrum with the 405 diode laser. Statistical test results showed there was immunomodulatory effect on each control group, followed by decreasing CEJ-AV distance. The combined diode laser and doxycycline group had shown the best immunomodulatory effects and followed by tissue remodelling since the first day of applied therapy. Statistical analysis showed there are decreased macrophages ($3,33 \pm 1,15$ become $2,00 \pm 0,00$ cells) and increased fibroblasts ($30,00 \pm 4,00$ become $32,33 \pm 3,05$ cells) cells number, so well decreased of CEJ-AV distance ($695,96 \pm 135,35$ become $538,27 \pm 99,84$ μm) after the last day of applied therapy. We concluded that the photodynamic therapy by combining laser diode and doxycycline can enhance the immunity on periodontitis rats.

Keywords : *Photodynamic therapy, Diode laser, Immune system, Periodontitis, Histopathology Anatomy.*