POTENCY OF BLUE *LIGHT EMITTING DIODE* (LED) FOR PHOTOINACTIVATION TO *Staphylococcus aureus* BACTERIA BY IT'S ENDOGENOUS PORPHYRIN

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ABSTRACT

Photodynamic Inactivation (PDI) represent a method was used for bacteria inactivation by using combination of endogenous pophyrin and light photon. The purpose of this study were to determine the instrument performance LED light source that had been assembled, recognize the potency of LED irradiating and optimization of LED irradiating energy dose for photoinactivation of *Staphylococcus aureus* bacteria ATCC 6538P with endogenous pophyrin, and characterized the effect of LED irradiating to bacteria by physically and chemically.

Performance measurement of LED instrument showed that blue LED had emission peak 430 nm and red 629 nm with 65 nm and 30 nm bandwidth. Temperature and irradiating time gauge of LED instrument showed that they had a good accuracy, comparison with calibrator. *Staphylococcus aureus* ATCC 6538P bacterium accumulated coproporphyrin III and from potency test indicated that irradiating with blue LED 430 nm yielded reduction of *Staphylococcus aureus* bacteria colonies 70%, and irradiating of red LED 629 nm was 22%. So that irradiating of blue LED had a greater potency to photoinactivation of *Staphylococcus aureus* bacteria. The analysis of LED irradiating energy dose by anova indicated that interaction of power and irradiating time of blue LED 430 nm having decrease in the percentage of *Staphylococcus aureus* colonies, with optimal irradiating was 75 mW/cm^2 power density and 30 minute time irradiating (energy density 135 J/cm^2) yielded percentage decrease of *Staphylococcus aureus* colonies biggest 75%. Chemically analysis showed the changes in saturated fatty acid profile (mirystic, palmitic and lauric) and changes in bacterial protein band profile. Physically analysis showed the cell wall damage of bacteria as effect blue LED irradiating at optimal energy dose. Hence, the blue LED instrument has a high potential for photoinactivation to *Staphylococcus aureus* bacteria.

Key word: photodynamic inactivation, LED, endogenous porphyrin photosensitizer, *Staphylococcus aureus*