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Antimicrobial effect of *pleomeleangustifolia* pheophytin A activation with diode laser to *streptococcus mutans*

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Abstract. The main purpose of this research is to identify potential of Pheophytin A. as photosensitizer a agent to inactivate *Streptococcus muttans* using laser diode of 405nm. Pheophytina is known as chlorophyll derivate that losses magnesium ion at the center of porphyrin ring structure. In this research, phrophytin was extracted from Suji leaf (Pleomeleangustifolia). To determine the antimicrobial effect of treatments on *S.mutans*, samples were divided into three groups as follows: (1) Groups A(treated with Pheophytin A. and laser 405 nm at varying energy density of 2.5; 5, 7.5; 10.0; 12.5; 15.0; 17.5 and 20.0 J/cm^2), (2) Group C$^-$(negative control, no treated), (3) Group C$^+$ (treated only with pheophytin). The experiments were repeated at least three times for each group. The results were analyzed using analysis of variance and the Tukey test. A P value ≤0.05 was considered to indicate a statistically significant difference. The decrement of percentage of number of bacterial colonyes growth was defined as: | (Σ sample colony - Σ control colony)/ Σ control colony | x 100%. The result showed that the incubation of Pheophytin A. using irradiation from laser diode of 405nm have a significant effect towards the decrement in bacterial growth. The most decreased percentage colony of *S. mutans* occurred on the incubation of pheophytin a treatment and laser irradiation 405nm with density 20 J/cm^2 is 61.9%. This showed that pheophytin a functions as a photosesitizer activator to inactivate *S. mutans* bacteria.

1. Introduction

Dental caries is a progressive pathological process of teeth's destruction, which is caused by combinations of diet, host, micro flora and exposure time [1]. Micro flora such as *Streptococcus mutans* is an acidogenic bacteria that colonized at teeth surface. Exposure time is the duration of teeth exposition towards acid produced by bacterial which causes teeth plaque. The main bacterial causing dental caries is a group of streptococci mainly *S. mutans*. *S. mutans,* which is a normal flora in oral. However, *S. mutans* might increase significantly at favorable environment and change to be pathologic [2].

aPDT is a non-antibiotic approach that was developed to inactivate microorganism, and it is a potential alternative compared conventional antibiotic [3]. aPDT combines a non-toxic photosensitizer and visible light resulting singlet oxygen and free radical that caused microbial cell destruction [4]. The main target of aPDT is an external microbial structure. Suitable adhesivity at bacterial structure causes destruction activated by light. Photosensitizer doesn't need to get into inside of the microorganism, therefore no resistance of microorganism [5].