TITLE: *Galleria mellonella* as host model for the study of *Porphyromonas gingivalis*: analysis of virulence and sensitivity to photodynamic therapy

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ABSTRACT:
Porphyromonas gingivalis is an important pathogen in the development of periodontal disease. Our study investigated if the treatment with antimicrobial photodynamic therapy (aPDT) that employs a nontoxic dye, followed by irradiation with harmless visible light can attenuate the experimental infection of *P. gingivalis* in *Galleria mellonella*. Firstly, different concentrations of *P. gingivalis* ranging from 10^2 to 10^6 cells/larva were injected into the animal to obtain a lethal concentration. Next, the following groups of *G. mellonella* infected with *P. gingivalis* were evaluated: inoculation of the photosensitizer and application of laser (P+L+), inoculation of physiologic solution and application of laser (P-L+), inoculation the photosensitizer without laser (P+L-) and inoculation of physiologic solution without Laser (P-L-). The effects of aPDT on infection by *P. gingivalis* were evaluated by survival curve analysis and hemocytes count. A lethal concentration of 10^6 cells/larva was adopted for evaluating the effects of aPDT on experimental infection with *P. gingivalis*. We found that after 120 seconds of PDT application, the survival rate of *G. mellonella* was significantly greater than the control groups (p=0.0010). Moreover, the hemocyte density in the P+L+ group was increased by 9.6 x 10^6 cells/mL (2.62-fold increase) compared to the infected larvae with no treatment (L-P- group) (p=0.0175). It may be concluded that the PDT application was effective against *P. gingivalis* infection by increasing the survival of *G. mellonella* larvae. In addition, PDT was able to increase the circulating hemocytes indicating that this therapy can activate the immune system. These promising results show that *G. mellonella* can be a suitable model for the study of the susceptibility of periodontal pathogens to new therapies.

KEYWORDS: *Porphyromonas gingivalis*, Photodynamic therapy, *Galleria mellonella*.

FINANCIAL SUPPORT: Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), (grant 2013/26820-4).