Abstract

Introduction. Photodynamic therapy is a two-step procedure, involving the use of photosensitizing agents followed by selective illumination of the target lesion with visible light. It produces highly reactive oxygen species and subsequent cellular damage.

Objective. This study was designed to determine whether Leishmania chagasi and L. panamensis promastigotes were sensitive to photodynamic therapy in vitro. Material and methods. Leishmania promastigotes were treated with aluminium phthalocyanine chloride and zinc phthalocyanine photosensitizers before illumination with visible light at 670 nm. The parasite photoactivity was calculated by sigmoidal regression analysis. Results. Leishmania chagasi promastigotes were highly photosensitive to aluminium phthalocyanine chloride treatment with effective inhibitory dose50 (ED50) concentration values of 0.0033, 0.0083 and 0.0093 µM upon exposure to 10.0, 5.0, and 2.5 J/cm² light intensities respectively. By contrast, the activity of aluminium phthalocyanine chloride on L. panamensis was significantly lower ( P<0.01) with ED50 values of 0.17, 0.25, 0.34 µM at the same light intensities. Zinc phthalocyanine activity was significantly ( P<0.01) less active than aluminium phthalocyanine chloride on both strains of these two species and no differences in zinc phthalocyanine activity were found between them. A dose-response phototoxic effect with both phthalocyanines was observed. Parasite inhibition was not observed after aluminium phthalocyanine chloride or zinc phthalocyanine treatment in the dark. The reference drugs hexadecylphosphocholine and amphotericin B were not photoactive.

Conclusion. Treatment of Leishmania promastigotes with aluminium phthalocyanine chloride and zinc phthalocyanine followed by illumination with visible light at 670 nm inhibited in vitro growth of promastigotes of L. chagasi and L. panamensis. Photodynamic therapy against Leishmania could be a promising strategy for leishmaniasis treatment.

Keywords

Leishmania, photochemotherapy, drug therapy, in vitro.