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ANTIFUNGAL ACTIVITY OF A MICONAZOLE-CARRIER MAGNETIC NANOSYSTEM ON DUAL SPECIES CANDIDA BIOFILMS

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Tema: Ciências Básicas

Iron oxide magnetic nanoparticles (IONPs) present interesting features for biomedical applications thereby have been implemented in therapies for controlling infectious diseases. The aim of this study was to evaluate the antifungal effect of a novel miconazole-carrier nanosystem (NS) on dualspecies biofilms of Candida albicans and Candida glabrata. The NS was synthesized by loading the chitosan-coated IONPs with miconazole and subsequently characterized by X-ray diffraction, Fouriertransform infrared spectroscopy and transmission electron microscopy. Mixed biofilms of both Candida species were formed in 96-well plates during 48 h, and treated with different concentrations of the NS (31.2 and 78 μg/mL) for 24 h, totalling a 72-h biofilm. Biofilm assays were performed both in the presence or absence of an external magnetic field. Free miconazole at 78 μg/mL and untreated biofilms were designated as positive and negative controls, respectively. Antifungal effect was evaluated by quantification of total biomass and cultivable cells. Biofilm structure was observed by scanning electron microscopy (SEM). Data were analyzed by two-way ANOVA followed by Holm- Sidak's post-hoc test ($\alpha = 0.05$). All tested groups displayed similar values for total biofilm biomass, and the presence of an external magnetic field did not interfere with the antifungal activity of the NS. Nevertheless, NS at 78 μg/mL exhibited the highest reduction in the number of cultivable cells of C. albicans (ranging from 1.84- to 1.96-log10; $p<0.001$), and significant reductions (~0.97-log10; $p<0.0001$) for C. glabrata, which were similar to those found for the positive control. Moreover, SEM images showed a less dense and compact structure for biofilms treated with NS at 78 μg/mL in comparison to the controls. In conclusion, NS showed antifungal effect against dual-species Candida biofilms, which should stimulate the development of alternative treatments against recalcitrant fungal infections.

Descritores: Biofilms; Candida albicans; Candida glabrata; Magnetite; Nanoparticles; Drug Delivery Systems.