

TITLE: PHOTOINACTIVATION OF *C. ALBICANS* WITH AND WITHOUT METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* BIOFILMS

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ABSTRACT

The resistance of biofilms to conventional antimicrobials has motivated the search for new treatments. The purpose of this study was to evaluate the Photodynamic Therapy (PDT) in inactivating biofilms of *Candida albicans* with and without methicillin-resistant *Staphylococcus aureus* (MRSA) using curcumin (CUR) as photosensitizer associated with a blue LED light source with a wavelength of 455 nm and light intensity of 33.58 mW/cm². *C. albicans* standard strain (ATCC 90028) was grown alone or with MRSA (ATCC 33591) for the formation of biofilms during 48 hours at 37°C. After incubation, the biofilms were washed and subjected to PDT. For this, 150µL aliquots of CUR at 1,200 µM were added on biofilms. After 40min of incubation, biofilms were illuminated with the LED light for 40min (57.6 J/cm², C+L+ group). Additional samples were treated only with CUR (C+L-), light (C-L+) or received no treatment (C-L-, control). The viability of the biofilms was analyzed by quantification of colonies (CFU/ml) of each species in specific culture media. Experiments were performed in triplicate on three separate occasions. Data were analyzed by ANOVA/Welch and post-hoc Games-Howell when the data were normal and heteroscedastic, and Kruskal-Wallis and Dunn when the data distribution was not normal ($\alpha=0.05$). For *C. albicans* mono-species biofilm, PDT promoted a significant ($p\leq 0.001$) reduction compared to the C-L- group; there was also a significant difference between the groups C-L+ and C+L- ($p=0.037$). For the multi-species biofilm submitted to PDT, a significant reduction for SARM ($p=0.007$) and for *C. albicans* ($p=0.040$) was observed compared to control groups (C-L-). In multi-species biofilm, for SARM significant differences were also observed between C+L+ and C+L- groups ($p=0.012$) and among C-L-, C+L- and C-L+ groups ($p\leq 0.027$). For *C. albicans*, no difference was observed between C-L-, C+L- and C-L+ groups. PDT mediated by CUR was effective in reducing the viability of *C. albicans* biofilms with or without MRSA.

Keywords: *Candida albicans*, Methicillin-Resistant *Staphylococcus aureus*, curcumin, Photochemotherapy, Biofilms

Financial Support: FAPESP 2013/23165-5, 2014/18345-7, CNPq 446401/2014-5 e PIBIC 34848.