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Synergistic Antifungal and Antibiofilm Efficacy of Amino-Functionalized Mesoporous Silica Conjugated with Photosensitizer against Multidrug-Resistant *Candida* Species

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Candida albicans is an opportunistic fungal pathogen that contribute to high morbidity and mortality rates in immunocompromised patients. Antimicrobial photodynamic therapy is an alternative modality to treat such biofilm forming resistant strains. This study aims to investigate the enhanced efficiency of newly synthesized Mesoporous silica nanoparticle -Rose bengal conjugate as an antifungal photosensitizer for antifungal photodynamic therapy against *C. albicans*. Functionalization of Mesoporous silica nanoparticles with amino groups was performed to increase the dye loading capacity. Conjugation process of Mesoporous silica nanoparticle -Rose bengal was confirmed using different techniques including UV–Vis spectroscopy, Fluorescent spectroscopy and FTIR analysis. A low power green laser 50 mW irradiation was applied (5 min) for activation of Mesoporous silica nanoparticle -Rose bengal conjugate and RB against *C. albicans* biofilm and planktonic cell. The comparative study of Mesoporous silica nanoparticle -Rose bengal conjugate and free Rose Bengal on antimicrobial photodynamic Therapy was evaluated using standard experimental procedures. Antibiofilm efficacy was determined using biofilm inhibition assay, cell viability and CLSM studies. The results revealed that Mesoporous silica nanoparticle -Rose bengal conjugate has a significant antifungal activity (88.62 ± 3.4%) and antibiofilm effect on *C. albicans* when compared to free dye after light irradiation. The MSN-RB conjugate based aPDT can be employed effectively in treatment of *C. albicans* infections.

Keywords: Antimicrobial photodynamic therapy, *Candida albicans,* Mesoporous silica, nanoconjugate

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