

TITLE: 2-CHALCONE AS A POTENT PHOTOSENSITIZER AGAINST BIOFILM OF DERMATOPHYTES

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Dermatophytes are fungi that invade keratinized tissues of man and animals, causing dermatophytosis. Recently, the ability of these fungi to form complex communities called biofilms has been described and this ability may be correlated with the long treatment time and common recurrences in this type of mycosis. This study aimed to evaluate the anti-dermatophytic and anti-biofilm activity of 2-chalcone alone and combined with photodynamic therapy (PDT). Strains of *Trichophyton rubrum*, *T. mentagrophytes* and one clinical isolate of *Microsporum canis* were used. Susceptibility tests were conducted according to the M38-A2 document proposed by CSLI. Planktonic cells, biofilms with 24 h (initial stage) and 72- 96 h of growth (mature) were formed in RPMI-1640 medium and placed in contact with different concentrations of 2-chalcone (1 - 500 mg / L), fluconazole (1,25 - 512 mg / L) and terbinafine (0.002 – 32 mg / L). The metabolic activities after the treatments were quantified using the tetrazolium salt (XTT) reduction method. The topographies of initial and mature biofilms with or without treatment were visualized by scanning electron microscopy (SEM). For the PDT assay, 2-chalcone was used as a photosensitizer and a blue led as a source of light with a dose of 150 J.cm⁻². All the strains, in the planktonic form, were inhibited by treatment with 2-chalcone (MIC= 3,9 - 7.8 mg/L), terbinafine (MIC= 0.008 - 0.03 mg/L) and fluconazole (1-64 mg/L). The 2-chalcone concentration required to eradicate biofilms with 24h for all strains tested was 15.6 mg/L, as well as, terbinafine in concentrations ranging from 0.06 to 16 mg/L and fluconazole inhibited only the *T. mentagrophytes* biofilm formation at a concentration of 32 mg/L. Regarding mature biofilms, only 2-chalcone was able to reduce the metabolic activities in the concentration of 31.2 mg/L. Mature biofilms were resistant to both antifungal drugs tested. When planktonic and biofilms (initial and mature) were treated with PDT using 2-chalcone as photosensitizer, the inhibitory concentrations were reduced by 4 times (2 – 8 mg/L). The SEM of biofilms treated with 2-chalcone showed a total collapse of the cell walls, resulting from a probable extravasation of cytoplasmic content.

Keywords: dermatophytes, biofilms, 2-chalcone, photodynamic therapy.

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