Antifungal activity of novel cobalt complexes on pathogenic *Candida albicans* strains

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Introduction: *Candida albicans* opportunistic pathogen is the fourth leading cause of nosocomial bloodstream infections, occurred particularly in immunocompromised patients. Its ability to form biofilms on different medical devices is associated with a high level of resistance to current antifungals and plays an important role in the chronicization and persistence of these infections. Therefore, there is an acute need for the development of new antifungal agents. Different metals such as zinc, cobalt, iron, their oxide forms or their complex combinations were synthesized and tested for their antifungal ability and antimicrobial activity, proving their efficiency against *S.aureus* and *C.albicans* strains, including both planktonic and biofilm-growing organisms.

The aim of this study was to assess the antifungal activity of new cobalt complexes on *Candida albicans* planktonic cells and biofilms.

Materials/methods: In these experiments, nineteen *C. albicans* strains isolated from different clinical sources were tested. The fungal strains were cultured on Sabouraud's dextrose agar (Oxoid) for 24h. Three cobalt (II) complexes were obtained by reaction between cobalt (II) metacrylate and imidazole derivatives: $[CoMacr_2Im_2]$ (AF1), $[CoMacr_2(2\text{-}MeIm)_2]$ (AF2) and $[CoMacr_2(2\text{-}EtIm)_2]$ (AF3). These were prepared as stock solutions in dimethyl sulfoxide (DMSO) and tested for their minimal inhibitory concentrations (MIC) and minimal biofilm eradication concentrations (MBEC) by the liquid microdilution and violet crystal microtiter method, respectively.

Results: The new cobalt complexes exhibited different efficiencies against the planktonic cells, with MIC values of the tested derivatives ranging from 5 to 0.625 mg/mL, while their MBEC from 0.31 2 to 5 mg/mL.
The efficiency of the tested complexes against planktonic cells, evaluated at the lowest value of the MIC and MBEC concentrations was, in decreasing order AF2>AF1>AF3, while against fungal biofilms formed by the *C. albicans* strains, was AF1>AF2=AF3.

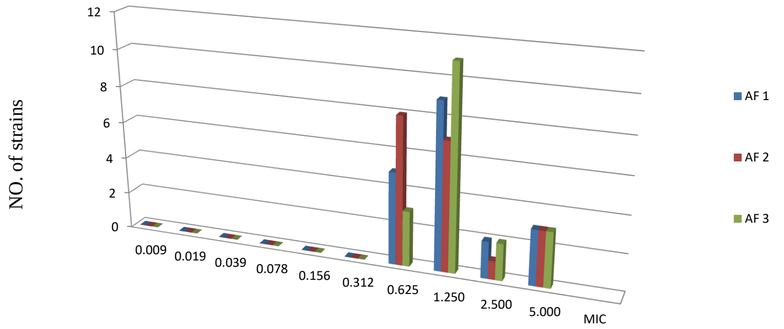

Fig. 1 : MIC of the cobalt complexes against *C. albicans* strains

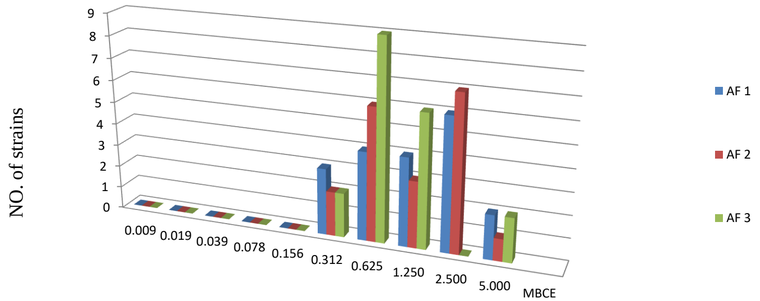

Fig .2 : MBEC of the cobalt complexes against *C. albicans* strains

Conclusions: The obtained cobalt complexes yield promising antifungal activity, being active both against planktonic and biofilm cells. However, further studies regarding the intimate mechanisms of their antifungal activity as well as a detailed knowledge of toxicity profiles, bioavailability, formulations, and drug interactions are needed.

References:
Karimiyan, Abbas et al., (2015). Antifungal Effect of Magnesium Oxide, Zinc Oxide, Silicon Oxide and Copper Oxide Nanoparticles against *Candida albicans*. Zahedan Journal of Research in Medical Sciences. p29-31 .

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