

TITLE: Antifungal activity of silver tungstate against dermatophytes and *Candida spp.*

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ABSTRACT:

Fungal infections represent a global public health problem. The incidence and the etiology of skin disease is variable, including dermatophytes, non-dermatophytes, or yeast fungi. The objective of this study was to evaluate the antifungal activity of a nanostructured molecule of silver tungstate ($\alpha\text{-Ag}_2\text{WO}_4$) against fungi responsible for superficial mycoses. The $\alpha\text{-Ag}_2\text{WO}_4$ molecule was synthesized by the simple coprecipitation method in 1:1 v/v of water and ethanol. The material was irradiated with electrons using a high resolution scanning electron microscope (SEM) model Supra 35-VP (Carl Zeiss, Germany), with an acceleration voltage of 15 kV. The antifungal susceptibility tests were performed considering the protocols of the Clinical and Laboratory Standards Institute M38-A2, for filamentous fungi, and M27-A3, for yeasts. Microplates were prepared with $\alpha\text{-Ag}_2\text{WO}_4$ final concentrations of 0.03 – 1000 $\mu\text{g/ml}$. The fungi tested included reference strains (*Trichophyton rubrum* CBS 118892, *Candida albicans* ATCC 90028, *Candida glabrata* ATCC 2001, *Candida parapsilosis* ATCC 22019, and *Candida krusei* ATCC 40147) and clinical isolates (*Trichophyton rubrum*, *Trichophyton mentagrophytes*, *Candida albicans*, *Candida glabrata*, *Candida parapsilosis*, and *Candida krusei*). Minimum inhibitory concentration (MIC) was defined as the lowest drug concentration capable of prevent any discernible growth. Regarding the results, MIC values observed for dermatophytes were 0.48–1.95 $\mu\text{g/ml}$ (0.48, 0.95, and 1.95 $\mu\text{g/ml}$ for *T. rubrum* CBS 118892, *T. rubrum* clinic, and *T. mentagrophytes* clinic, respectively). For *Candida spp.*, MIC values exhibited a wider range (0.95–7.81 $\mu\text{g/ml}$). Greater activity of $\alpha\text{-Ag}_2\text{WO}_4$ was observed for *C. krusei* (0.48 $\mu\text{g/ml}$ for both strains), while the lowest activity was observed for *C. glabrata* (1.95 and 7.81 $\mu\text{g/ml}$, for ATCC 2001 and clinical isolate, respectively) and *C. parapsilosis* (3.9 and 1.95 $\mu\text{g/ml}$, for ATCC 22019 and clinical isolate, respectively). MIC values for *Candida albicans* were 1.95 $\mu\text{g/ml}$ (ATCC 90028) and 0.95 $\mu\text{g/ml}$ (clinic). These results open possibilities for new therapeutic approaches using silver tungstate for the control of fungal infections, which may have a positive impact on clinical dermatology and infectious diseases management.

KEYWORDS: silver tungstate, fungal infections, antifungal activity.