TITLE: ADDITION OF SILVER NANOPARTICLES CONFERS ANTIFUNGAL ACTIVITY TO CEMENT-BASED GROUTS

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ABSTRACT:
Brazil is one of the largest grain producers in the world. However, during growth, harvesting and storage, toxigenic fungal strains produce mycotoxins with hepatotoxic, mutagenic, immunosuppressive, and neoplastic activities, which results in reduced productivity and quality and economic losses. Nanotechnology has contributed to the manufacture of products with different characteristics; for example, different functions can be assigned to cementitious materials. This study aimed to evaluate the antifungal activity of silver nanoparticles incorporated into cement-based grouts against *Aspergillus niger* and *Fusarium oxysporum.* Silver nanoparticles (AgNP) were obtained by reducing silver nitrate (2 mM) with sodium borohydride (4 mM), to give a 107.95 ppm/mL Ag solution. Specimens composed of cement and hydrating liquid (water and/or AgNP) were produced by using a 0.32 water/cement ratio and molded into circular shapes (5-mm diameter x 4-mm thickness). Biofilm formation inhibition was evaluated in 24-well microplates at 37 ºC for 48 h, and Colony Forming Units (CFU) per milliliter (mL) were counted. The CFU/mL count decreased significantly ($p<0.05$) for the grouts produced with 50% and 100% AgNP; reduction in *F. oxysporum* cell viability was ~57% and 99%, respectively. Concerning *A. niger*, the average reduction was 57%, irrespective of the AgNP concentration. The results indicate potential application of AgNP incorporated into the cement matrix as an alternative to the traditional grout used in the construction of warehouses. The effective antifungal activity of AgNP against important storage fungi can help to minimize/eradicate exposure to mycotoxins and their harmful effects.

Keywords: fungus, grain, grout, mycotoxin, nanoparticle.

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