TITLE: BIOPROSPECTION OF ANTIMICROBIALS AND COLD-ADAPTED ENZYMES IN FILAMENTOUS FUNGI ISOLATED FROM ANTARCTIC SOILS

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ABSTRACT:

Microbial growth in Antarctic ecosystems is limited due to very low temperatures, extreme dryness, low nutrient availability and high UV radiation doses. In such environment, microbes known as psychrophiles and psychrotolerants thrive and can produce several products of biotechnological interest, like new antimicrobial molecules and cold adapted enzymes. Antimicrobial resistance is rising to dangerously high levels globally, making the search for new compounds a constant request. The aim of this work was to isolate filamentous fungi from Antarctic soil samples and characterize their ability to produce enzymes and antimicrobials of biotechnological interest. Soil samples were collected in front of the Collins Glacier, southwest of King George Island, Antarctica. These soils were previously covered by glacial ice for about 2500-3500 years, and recently became exposed to the atmosphere due to a rise in the mean air temperature followed by glacier melt. This scenario highlights the potential of still unknown cold-adapted extremophiles for biotechnological applications, since they can provide enzymes with a greater cost-benefit on industrial processes. Ten grams of each sample were dissolved in saline solution (0,85% NaCl), plated on potato dextrose agar medium and incubated at 7°C and 25°C for two weeks. A total of 96 strains of filamentous fungi were obtained. Screening for antimicrobial activity was done with the agar diffusion method. The strains were tested for enzyme production using agar plate assays for amylase, cellulase, lipase and. No strain had antimicrobial activity against *Salmonella* serovar Typhimurium and *Candida albicans*. One, six and 27 inhibited *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* growth, respectively. Five isolates inhibited both *P. aeruginosa* and *S. aureus*. Regarding enzyme production at 7°C, 23, 43, 11 and 23 showed activity for amylase, cellulase, lipase and protease, respectively. At 25°C, 17, 23, 16 and 13 strains were positive for the mentioned enzymes, respectively. The identification of the strains is in progress. So far, this study has shown that Antarctic fungi can be a source of possible new antimicrobials and cold-adapted enzymes. Next studies should consider large production and characterization of these molecules. The results motivate further studies regarding measure of enzymatic activity, their characterization, optimized production, and screening for other biomolecules.

Keywords: Antarctica, filamentous fungi, bioprospection, enzymes, antimicrobials

Development agency: CNPq/PROANTAR (#407816/2013-5); CNPq/UNIVERSAL (#426949/2016-1)