TITLE: INHIBITION OF PATHOGENIC BACTERIAL BIOFILMS BY METABOLITES PRODUCED BY ANTARCTIC BACTERIA

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ABSTRACT:

Biofilms are related to the persistence of chronic infections and are refractory to antimicrobial agents. Taken into account the difficulty of treating biofilms and the increasing bacterial resistance to antibiotics, the search for strategies to prevent or treat biofilm infections is extremely necessary. The aim of this study is to search for novel compounds able to inhibit biofilm formation or to disrupt preformed biofilms without impairing bacterial growth, thus applying less selective pressure for the development of resistance. In this work, we used the crystal violet assay to perform a screening for anti-biofilm compounds produced by 20 bacteria isolated from Antarctic samples of soil, snow and water. We tested the Antarctic bacterial culture filtrates, evaluating their ability to inhibit biofilm formation or to disperse mature preformed biofilms of *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Staphylococcus epidermidis*. Eleven out of the 20 tested culture filtrates presented some activity against one or two of the biofilm-forming bacteria. The culture filtrate obtained by incubating the Antarctic isolate *Arthrobacter psychrochitiniphilus* S12T2 in TSB medium was selected for further bioassay-guided fractionation. Preliminary studies using a centrifugal ultrafiltration-based method demonstrated that its antibiofilm activity was due to a small molecule (molecular weight lower than 3 kDa). The partial purification followed two steps. First, the culture filtrate was extracted with ethyl acetate. Next, the compounds of the organic phase were applied to a reversed-phase C18 solid phase extraction (SPE) cartridge. The compounds were eluted with increasing concentrations of methanol. The antibiofilm assay showed that the SPE fraction eluted with 75:25 (v/v) methanol:water was able to decrease biofilm formation of *S. aureus* and *S. epidermidis*. These results indicate that the active compound is a small polar molecule. Further fractionation steps are ongoing aiming at isolating and identifying the bioactive molecule. Our study demonstrates that Antarctic bacteria can be a promising source of active compounds with potential anti-biofilm activity.

Keywords: antarctic bacteria, anti-biofilm, pathogenic biofilm

Development Agencies: Capes, CNPq, Fapergs