Investigating the ability of saltwater isolates to inhibit biofilm formation by clinically significant pathogens

Abstract

Background

Nosocomial pathogens are responsible for chronic and persistent infections partly due to their ability to form protective biofilms which enhance their antibiotic tolerance. Biofilm disruption combats antimicrobial resistance as dispersed cells regain antibiotic susceptibility. The goal of this study was to evaluate the antibiofilm potential of isolates from marine environments against a pathogen panel consisting of MRSA and clinical *Staphylococcus aureus* strains, *Acinetobacter baumannii* and *Escherichia coli* pathogens.

Method

A large bank of salt water bacterial isolates was cultured in glucose-supplemented trypticase soy broth (TSBg) and resulting colonies were screened against the pathogen panel. Isolates of interest were further examined for bactericidal and antibiofilm activity.

All bacterial strains and isolates were standardised using McFarland standards. The minimum biofilm inhibitory and eradication concentrations (MBIC and MBEC) were measured using a crystal violet (0.1%) staining assay. Bacterial viability within biofilm was determined as the reduction [%] in metabolic activity as determined by the 2,3,5-triphenyltetrazolium chloride (TTC) assay.

Results

Two saltwater isolates significantly reduced the ability of all the tested strains form biofilm. $MBIC_{50}$ was achieved for *S. aureus, A. baumannii* and *E. coli* at an isolate concentration of $7.8x10^3$, $1.2x10^4$ and $6.25x10^3$ CFU/mL respectively. An increase in biofilm eradication and reduction in metabolic activity was observed solely against *S. aureus* and *E. coli* strains.

Conclusions

Selected saltwater isolates demonstrated inhibitory and disruptive potential against biofilm forming strains. However, further investigation is required to optimise their activity against mature biofilms.

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