Secondary metabolites obtained from caatinga plants endophytic microorganisms and evaluation of antimicrobial and antibiofilm activity

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Introduction

Endophytic fungi are those that live inside plant tissues, but without causing harm to the host(1), present themselves as promising natural sources in the search for molecules with bioactive potential against pathogenic bacteria of medical importance(2).

Experimental section

Two microorganisms endophytic, CAAT 004 and CAAT007, isolated from Caatinga plants, after fermentation and obtaining their crude extracts, mycelial extracts were selected based on previous antibacterial and anti-biofilm formation tests to proceed to fractionation in a C18 cartridge. The resulting semi-purified fractions were evaluated for antibacterial and anti-biofilm formation activity against *Staphylococcus aureus* Newman and *Pseudomonas aeruginosa.*

Results and Discussion

As a result, five fractions of CAAT 004 mycelium extract were active in inhibiting the formation of *S. aureus* Newman biofilm. Fraction of 30% MeOH inhibited 76% of the biofilm at the concentration of 24µg.mL^{-1} and antibacterial activity by 19%, the 60% MeOH fraction inhibited the biofilm by 91% at the concentration of 24µg.mL^{-1} and obtained antibiotic activity of 46%, the 70% MeOH fraction inhibited 92% of the biofilm with a concentration of 48µg.mL-1 and antibiotic activity of 13% for this same concentration, the 80% and 100% MeOH fractions exhibited antibiofilm activity of 76% at the concentration of 48µg.mL^{-1} and showed no antibacterial activity. The fractions did not show significant inhibition of *P. aeruginosa* biofilm. For the CAAT 007 mycelium extract, seven fractions were active against the biofilm of *S. aureus* Newman, they are: the 20% MeOH fraction inhibited the biofilm by 50% (48µg.mL^{-1}) and did not show antibiotic activity, the 30% MeOH fraction inhibited 69% (48µg.mL^{-1}) the biofilm and did not show antibiotic activity, the 40% MeOH fraction inhibited 61% of the *S. aureus* biofilm at a concentration of 24µg.mL^{-1} and 14% antibiotic activity at this same concentration, the 50% MeOH fraction inhibited the biofilm by 62% (48µg.mL^{-1}) and obtained 10% antibiotic activity (6µg.mL^{-1}), the 60% MeOH fraction inhibited the biofilm by 56% (24µg.mL^{-1}) and showed no antibiotic activity, the 70% MeOH fraction inhibited the biofilm by 57% (48µg.mL^{-1}) and 10% antibiotic activity and finally the fraction of 100% MeOH inhibited *S. aureus* biofilm by 50% at a concentration of 48µg.mL^{-1} and was not active in inhibiting bacterial growth. These fractions were not active in the inhibition of the biofilm of *P. aeruginosa*. However, this extract presented two fractions with antibacterial activity for *P. aeruginosa* of 39% and 40% of inhibition for the fractions of 40% MeOH and 60% MeOH, respectively, at a concentration of 48µg.mL^{-1} for the two fractions.

Conclusions

The results presented demonstrate the bioactive potential of secondary metabolites of endophytic microorganisms obtained from Caatinga plants in inhibiting the biofilm of important pathogens such as *S. aureus* Newman and *P. aeruginosa*.

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References

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