Antimicrobial potential of symbiotic relationships identified from marine environment

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Abstract

As resistant pathogens become more and more difficult to treat with the same level efficacy, the concern for antibiotic resistance greatly grows as we search for new antibiotics to replace now ineffective ones. One approach to combatting antibiotic resistance is identifying microbial natural products derived from unique ecological niches that exhibit antimicrobial activity. The present study used a disk diffusion assay to examine antimicrobial activity of a cell-free extract and semi-purified fractions from *Bacillus subtilis* strain DSK086 against the commonly resistant pathogens, *Staphylococcus aureus, Klebsiella pneumoniae, Pseudomonas aeruginosa, Candida auris* and *Candida albicans*. DSK086 originates from *Olencira praegustator*, a marine parasitic isopod collected from the mouth of an Atlantic menhaden fish in the Cape Fear region. Inhibition zone diameter (IZD) measured from disk diffusion examined extract antimicrobial activity, inhibiting *S. aureus, K. pnneumoniae, P. aeruginosa, C. auris* and *C. albicans*, while proving inable to inhibit bacteria *Acinetobacter baumannii, Enterobacter cloaecae* and *Enterobacter aerogenes,*in comparison to the antibiotic ampicillin and nystatin. The greatest antimicrobial activity was exhibited by the DSK068 extract against *S. aureus* and *K. pneumoniae*. Semi-purified fractions of DSK068 were shown to contain iturins and surfactins as potential antimicrobial contributors. These findings suggest that the antimicrobial properties of DSK086 extract may occur as result of synergistic activity associated with the membrane-active properties of iturins and surfactins. In this perspective, it warrants further research into the purification of bioactive compounds isolated from DSK086 extract to examine potential synergy. Progress in areas assessing the marine environment niche along with host-parasite interactions provides a promising new direction for antibiotic discovery.