ANTIMICROBIAL POTENTIAL OF BLOOD COCKLE (*TEGILLARCA GRANOSA*) HEMOLYMPH AS A SUSTAINABLE MARINE BIORESOURCE

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Abstract

The rising threat of antimicrobial resistance has intensified the search for sustainable bioresources with biomedical value. Marine invertebrates possess developed innate immune systems and produce molecules with antimicrobial properties. The blood cockle, *Tegillarca granosa*, is of interest because, unlike many bivalves, it contains hemoglobin-rich hemolymph that may contribute to antimicrobial defense through hemoglobin-derived peptides and other immune factors. This study investigated the antimicrobial potential of *T. granosa* hemolymph-derived preparations toward their use in biotechnology and bioactive product development. Hemolymph was collected from *T. granosa* from Negombo Lagoon, Sri Lanka, and separated into plasma and hemoglobin (Hb) lysate fractions. Antibacterial activity was assessed against three wound-associated bacterial types; *Escherichia coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*, using the disc diffusion method. Tetracycline and saline served as positive and negative controls, respectively. Plasma and hemoglobin lysate produced inhibition zones against *E. coli* and *S. aureus*, with inhibition diameters of 6.05 ± 0.16 mm (plasma) and 5.78 ± 0.37 mm (Hb lysate) for *E. coli*, and 5.71 ± 0.34 mm (plasma) and 5.53 ± 0.12 mm (Hb lysate) for *S. aureus*, whereas no inhibition was observed against *Pseudomonas spp*. Tetracycline produced inhibition diameters of 23.24 ± 0.72 mm, 26.09 ± 1.01 mm, and 11.56 ± 3.05 mm against *E. coli*, *S. aureus*, and *Pseudomonas aeruginosa*, respectively. The hemolymph-derived preparations showed modest antibacterial activity compared with tetracycline, with activity against *E. coli* and *S. aureus* but not *Pseudomonas spp*. This differential response may be associated with differences in bacterial susceptibility to bioactive components present in crude hemolymph fractions. The detection of inhibition using crude, minimally processed hemolymph fractions highlight the presence of bioactive antimicrobial components in *T. granosa* and supports its promise as a readily obtainable, cost-effective marine bioresource leading to investigation in wound-care and biotechnology, while environmental implications of obtaining *T. granosa* should be considered when evaluating sustainability.

Keywords: *Tegillarca granosa*, hemolymph, antimicrobial activity, marine biotechnology, sustainable Bioresource