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ABSTRACT BOOK

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Immunotoxic and oxidative stress responses in the tropical seastar *Astropecten euryacanthus* exposed to polystyrene microplastics

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Abstract

Microplastics have emerged as pervasive and persistent pollutants and are now recognised as one of the major global contaminants of estuarine and coastal ecosystems. Their multifaceted toxicological effects compromise the immunophysiological homeostasis of marine biota, posing a significant ecological concern. The present study investigates the immunotoxic potential of weathered polystyrene (PS) microparticles on the coelomocytes of the tropical seastar *Astropecten euryacanthus*, a dominant benthic suspension feeder inhabiting the coastal waters of West Bengal, India. Polystyrene microparticles of industrial origin, identified as a prevalent component of coastal marine litter, were subjected to physicochemical characterisation using microscopy, Fourier transform infrared (FTIR) spectroscopy, and micro-Raman spectroscopy to confirm polymer identity and surface weathering patterns. Seastars were experimentally exposed to environmentally relevant concentrations of PS microparticles (0.25, 0.5, and 1 mg L⁻¹) for 7 and 14 days under controlled laboratory conditions. Immunological and oxidative stress responses were assessed through total coelomocyte count, cytotoxicity assays, and quantification of reactive oxygen and nitrogen species. Exposure to PS microparticles resulted in a significant reduction in coelomocyte count, accompanied by disruption of the antioxidant–prooxidant balance. Prolonged (14-day) exposure markedly elevated superoxide anion production while suppressing nitric oxide generation, indicating oxidative stress-mediated impairment of coelomocyte cytotoxic efficacy. The observed immunophysiological alterations demonstrate that *A. euryacanthus* is highly susceptible to microplastic-induced stress. As a benthic suspension feeder, this species can serve as a sensitive bioindicator for assessing microplastic contamination in tropical coastal ecosystems. Overall, the findings highlight that unregulated microplastic pollution in coastal waters may impose chronic immunotoxic and oxidative stress on marine invertebrates, reflecting a broader decline in environmental health and ecological integrity of coastal habitats.