Linking Organic Matter Sources to Diarrhetic Shellfish Toxin Accumulation in Coastal Mussels During a Harmful Algal Bloom

Oral

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We investigated the relationship between isotopic trophic markers and the accumulation of okadaic acid (OA) in *Perna perna* mussels collected from Arraial do Cabo, southeastern Brazil, following a massive harmful algal bloom (HAB) recorded in December 2021 to March 2022. The bloom, dominated by *Scrippsiella*, *Tetraselmis*, and unidentified dinoflagellates likely from the family *Kareniaceae*, extended along >150 km of coastline and resulted in widespread discoloration of coastal waters.

Stable isotope analysis ($\delta^{13}C$ and $\delta^{15}N$) revealed a narrow dietary range centered on phytoplankton/particulate organic matter (POM), with minor contributions from detrital and sewage-derived sources. Okadaic acid concentrations in mussel tissues ranged from 3.59 to 89.5 ng/g dry weight (mean = 19.3 ng/g), below the Brazilian legal limit for human consumption (160 ng/g wet weight).

A significant positive correlation was observed between OA levels and $\delta^{15}N$ values ($R^2 = 0.61$, $p < 0.001$), suggesting that individuals occupying higher trophic positions accumulated greater amounts of OA. No significant correlations were found between OA and biometric parameters such as shell length or tissue mass. These findings highlight that not only HAB occurrence but also organic matter origin and assimilation pathways strongly influence the accumulation of diarrhetic shellfish toxins in filter-feeding bivalves.

Our study underscores the value of ecological tracers in understanding toxin dynamics in coastal ecosystems, offering insights into the trophic mechanisms underlying OA bioaccumulation following algal bloom events.

Palabras Clave

(1) Okadaic acid; Stable isotopes; Trophic transfer.

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