Floodwater from Laguna dos Patos (Rio Grande do Sul) Impairs Sperm Quality in Zebrafish (*Danio rerio*)

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INTRODUCTION: The triple planetary crisis—chemical pollution, biodiversity loss, and climate change—poses a growing threat to global sustainability and ecosystem health. In this context, chemically contaminated floodwaters resulting from an extreme climate event in Rio Grande do Sul, Brazil (2024), prompted concern regarding reproductive health in aquatic organisms and potential risks to human health. **OBJECTIVE:** This study aimed to evaluate the reproductive toxicity of floodwaters by analyzing sperm quality parameters in adult male zebrafish (Danio rerio), a vertebrate model with ~70% genetic similarity to humans. **MATERIALS AND METHODS:** Water samples were collected from Laguna dos Patos, a region significantly impacted by floodwaters, and shown to contain a complex mixture of pesticides, metals, and hydrocarbons. A pilot test confirmed no mortality across water dilutions, allowing for 100% contaminated water to be used in exposure. Zebrafish were divided into two groups (control and exposed) and maintained for 14 days. Sperm was collected via testicle extraction, followed by dilution in BTS for sperm kinetics analysis through visual microscopy. Oxidative stress parameters—membrane fluidity, membrane rupture, and functionality—were evaluated by flow cytometry. Data were analyzed using parametric Student's t-test, with $p < 0.05$ considered statistically significant. **RESULTS:** Exposed zebrafish showed a marked decrease in sperm motility rate and duration. Flow cytometry indicated increased membrane fluidity and rupture, alongside reduced membrane functionality, reflecting oxidative damage and impaired sperm quality. **CONCLUSION:** The findings suggest that exposure to chemically contaminated floodwaters compromises the reproductive capacity of zebrafish and highlights the broader implications for biodiversity conservation, particularly in sensitive biomes like the Pampa. Furthermore, zebrafish prove to be a valuable model for extrapolating potential human health risks under the One Health framework. This study reinforces the need for rapid ecotoxicological assessments after climate disasters and illustrates how zebrafish-based analyses can support environmental health surveillance and enhance climate resilience strategies in southern Brazil.