NANOENCAPSULATION OF AMPHOTERICIN B: TOXICOLOGICAL INSIGHTS AND ENHANCED BIOAVAILABILITY IN ZEBRAFISH (*DANIO RERIO*) EMBRYOS

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INTRODUCTION: Amphotericin B (AmB) is a widely used antifungal drug, also prescribed for certain neglected tropical diseases such as leishmaniasis. However, its clinical use is limited due to poor oral bioavailability and associated adverse effects, leading to the exploration of alternative drug delivery strategies. Polymeric nanoparticles (PNP) have emerged as promising drug carriers, offering benefits like controlled release and improved bioavailability. Nevertheless, concerns about the potential toxicity of nanomaterials highlight the need for further nanotoxicological studies. Zebrafish (Danio rerio) embryos serve as a valuable model for toxicity assessment due to their genetic similarity to humans and well-established developmental evaluation protocols. OBJECTIVES: In this study, poly(lactic acid) (PLA) and polycaprolactone (PCL) PNP loaded with AmB were synthesized and evaluated in vivo using zebrafish embryos and larvae. METHODS AND RESULTS: Fluorescence microscopy confirmed the penetration of PNP into the organisms. Toxicity tests, adapted from OECD TG 236, revealed increased toxicity of nanoformulated AmB compared to its non-nanoformulated counterpart. However, previous studies have demonstrated that the polymers themselves are biocompatible and not the source of toxicity. Regarding potential cardiotoxicity, heart rate assessments on the final day of exposure indicated that AmB-loaded PNP did not induce adverse cardiac effects. Additionally, we observed that the post-fertilization time at which testing begins influences the experimental outcomes. CONCLUSION: Our findings strongly suggest that AmB bioavailability may have been enhanced, as evidenced by microscopy and toxicological data indicating increased drug absorption in zebrafish embryos.

KEY WORDS: zebrafish; polymeric nanoparticles; amphotericin b