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Preliminary data on the ecotoxicity effects of the novel synthetic cathinone 3,4-methylenedioxypyrovalerone (MDPV) on *Danio rerio* during early developmental stages

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Abstract

Background: The use of synthetic cathinones (SC) for recreational purposes has become increasingly common among young individuals in recent years [1]. As a result, SC have been detected in aquatic environments even at low concentrations (between ng L^{-1} to µg L^{-1}) [2] that can negatively impact freshwater vertebrates [3]. Since SC are designed to affect the nervous system, they could potentially cause unpredictable harmful effects on nontarget organisms [1]. Several SC, including 3,4-methylenedioxypyrovalerone (MDPV) were frequently detected in wastewater and aquatic environments [2]. Given the limited research on the ecotoxicity of MDPV, it is essential to evaluate its potentially harmful effects on aquatic organisms. **Objective:** This work aimed to assess the adverse effects of racemic MDPV on the mortality and embryonic development of zebrafish (*Danio rerio*) after 96 hours of exposure. **Methods:** Zebrafish embryos (≈ 3-hours post-fertilization (hpf)) were exposed to different nominal concentrations of MDPV (0.18, 0.35, 0.70, 1.4, and 2.8 µg L^{-1}) for 4 days at 28 °C, using 50 animals per concentration and control (5 replicates). Mortality data was recorded every day until day 4. Embryonic development data, namely the first spontaneous movements were evaluated at 24-hpf in a random subsample of 10 individuals per concentration and replicate, and hatching rate at 48- and 72-hpf in all alive organisms per concentration and each replicate. **Results:** MDPV did not cause significant effects on either mortality or embryonic development parameters. Despite that, it should be noted that organisms exposed to MDPV showed a slight increase in the 48-hpf hatching rate (at all concentrations tested) compared to the control. **Conclusions:** The present study shows that MDPV exposure seems not to impair *D. rerio* development in the early stages, however, more studies should be performed to verify and clarify the observed effects, as well as the assessment of potential teratogenic effects.

Keywords: chiral psychoactive drugs; aquatic toxicity; zebrafish

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