

vivo toxicity, particularly in invertebrates, under changing water pH. In the present study, the ecotoxicity of FLX ($pK_a = 9.8$) was investigated in different pH levels (6.8, 8.3, and 9.2) using *Daphnia magna*. *Daphnia* neonates (F0) were exposed to 0, solvent control, 31.3, 62.5, 125, 250, 500, or 1000 $\mu\text{g/L}$ for 48 hr and its effects on survivals (EC20, 50 and 75) were determined. Moreover, *Daphnia* neonates (The first brood daphnids from the chronic tests were discarded and the second brood daphnids (F1) were employed for the multigenerational acute test within 12 hours. F1 neonates were further exposed to 0, solvent control, 31.3, 62.5, 125, 250, or 500 $\mu\text{g/L}$ for 48 hr and their survivals (EC20, 50 and 75) were determined. F0 juveniles exposed to 0 or 55.6 $\mu\text{g/L}$ at 10 d were measured for MDA. After 48 hr of F0 and F1 exposure, the EC50 significantly decreased ($p < 0.05$) at 6.17 $\mu\text{g/L}$ of FLX at all tested pHs. Moreover, after 21 d F0 exposure, the reproduction showed an increasing trend until 55.6 $\mu\text{g/L}$ and significantly decreased at 166.7 $\mu\text{g/L}$ at pH 9.2. F1 neonates showed significantly decreased body length after 21 d exposure to 2.06, 6.17, 18.5 and 55.6 $\mu\text{g/L}$ at pH 9.2. Malformation of F1 daphnids development was also observed at 2.06 $\mu\text{g/L}$ to 500 $\mu\text{g/L}$. MDA concentration was also demonstrated increasing trends in all pHs and significantly increased at 55.6 $\mu\text{g/L}$ at pH 6.8 and 9.2. Our observation clearly indicates that survival, reproduction, and growth performance in aquatic invertebrate can be adversely affected by FLX and the toxicity increases as water pH increases. A greater amount of uncharged ions from FLX has increased Reactive Oxidative Stress (ROS), MDA, by the ionic speciation at higher pH. Increased MDA concentration affected the mortality of F0 daphnids. Increased F1 daphnids population demonstrated significantly greater toxicity. As a result, the toxicity of FLX has increased acutely, chronically, and multigenerational effects by increasing pH levels. Consequences of longer-term exposure over multi-generations warrant further investigation.

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Impacts of water pH on the toxicity of fluoxetine on *Daphnia magna*: a multi-generational study

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Fluoxetine (FLX), a selective serotonin reuptake inhibitor (SSRI), has been widely prescribed as anti-depressant. While FLX has been frequently detected in surface waters, sediments and biota, only limited information is available on its *in*