

MODULATION IN BEHAVIOR AND RESPIRATORY DYNAMICS OF THE FRESHWATER FISH, *CYPRINUS CARPIO* (LINNAEUS) UNDER CHLORPYRIFOS INTOXICATION

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Abstract

Effect of chlorpyrifos at different concentrations and exposure periods were investigated on the freshwater fish, *Cyprinus carpio* to elucidate impact of chlorpyrifos on acetylcholinesterase (AChE) activity and respiratory rate. Carp were exposed to one seventh (0.0224 mg/L) and one fourteenth (0.0112 mg/L) of the lethal concentration (0.160 mg/L) of chlorpyrifos for 1, 7 and 14 days and allowed to recover in toxicant free medium for seven days only after 14 days of exposure. AChE activity was determined spectrophotometrically using acetylthiocholine iodide as substrate in the tissues of brain, gill and muscle. Time and dose dependent inhibition of AChE activity by chlorpyrifos in the tissues of the fish, *C. carpio* is evidenced in the present study. Maximum decrement in AChE activity of the exposed fish was recorded in brain followed by muscle and gill on day 14 in both the sublethal concentrations of chlorpyrifos. Recovery periods witnessed increment in AChE activity but significantly differed in comparison with control group. Drastic variations in respiratory rate (-71.851 to 119.526%; -75.655 to 17.582%) were observed in both one seventh and one fourteenth sublethal concentrations of chlorpyrifos respectively. An alteration in respiratory rate did not follow neither time nor dose dependency and revealed to be independent of AChE inhibition of brain and gill. Variations in respiratory rate may be a consequence of impaired oxidative metabolism and elevated metabolic response by the fish against chlorpyrifos stress. Depression of AChE activity and impairments in fish respiratory physiology even under recovery periods of both the sublethal concentrations can be viewed as higher half-life of chlorpyrifos *in vivo* and biotransformation of sequestered chlorpyrifos in the storage organs.

Keywords: Chlorpyrifos-ethyl, Common carp, Neurobehavioral toxicity, AChE inhibition, ACh accumulation, Respiratory distress, Recovery