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STUDIES ON THE TOXICITY OF COMPOSITE TANNERY EFFLUENT USING GUPPY (*Poecilia reticulata*) AS A FISH MODEL

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Abstract

East Calcutta Wetland ecosystem is a Ramsar Site in India covering almost 51 km^2 and is one of the largest of its type. This wetland receives a massive load of almost untreated industrial and domestic effluents every day, throughout the year, that has been effectively utilized in pisciculture for having a better yield (2.85 metric tons of fish per 0.01 km^2 of water body per annum). The present investigation was carried out to study the toxicity of the untreated effluents discharged from tanneries located at the fringe of East Calcutta wetlands. Guppy (*Poecilia reticulata*) was chosen as a model fish and was exposed to three different sublethal concentrations (3%, 6% and 9%) of composite tannery effluents (TE) for different time periods (4 days, 7 days and 15 days). Exposed fish livers were analyzed for metallothionein (MT, a ubiquitous metal binding protein), cytochrome P4501A1+1A2 (CYP, a major family of xenobiotic metabolizing enzyme in fish biosystem) and nonspecific cytotoxic cells (NCCs, a major group of innate immune system in fish) expressions applying indirect enzyme-linked immunosorbent assay (ELISA) procedure. Results showed that expression of all the three chosen biomarkers were significantly dose and time dependent upon tannery effluent exposure. Major significances drawn from the present study was that fish species cultivated in east Calcutta wetland ecosystem are under potential threat of contamination and stress induced by composite tannery effluents that could lead to adverse physiological conditions. Moreover, these findings could be important in terms of designing biomarkers for early environmental warning system and also for monitoring fish health.

Key words: biomarkers, cytochrome P450, innate immunity, metallothionein, tannery effluent

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