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Physiological and histopathological responses to sublethal concentrations of copper in the teleost fish, *Anabas testudineus* (Bloch -1972)

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The present study was designed to evaluate the effects of sublethal concentrations of copper, an essential metal on the physiological and histopathological indices of the teleost fish, *Anabas testudineus*. The 96 hr. LC_{50} value of copper by static renewal bioassay method in *Anabas testudineus* derived by Probit method was 1.7 mg/L. The protective and therapeutic effects of vitamin C supplementation along with the toxicant were also determined. The free radical scavenging antioxidant enzymes like catalase (CAT) and superoxide dismutase (SOD) and hepatotoxic biomarker enzymes like alanine transaminase (ALT) and aspartate transaminase (AST) increased significantly in the serum of intoxicated fish. Significant reduction was observed in humoral factors in fish exposed to various toxicant concentrations in comparison with control group. Obvious symptoms of macrocytic hypochromic hypoxic anaemia and amitotic erythrocytes were detected in higher toxicant concentrations and long exposure periods. A significant elevation of serum glucose, cortisol, lactate dehydrogenase and alkaline phosphatase were detected in toxicant exposed samples as indices of heavy metal stress induced by hyperglycemia. The lipid peroxidation (LPO) values decreased significantly in all the target tissues and organs under consideration. The fish treated with copper together with vitamin C showed significant improvement in enzyme levels, tissue metabolites and lipid peroxidation level. Histopathological studies clearly depicted degenerative changes in liver, gills, and kidney and to some extent in muscle of fish under metal stress. The vitamin C restored the enzymatic activity in metal intoxicated fish to near control values by neutralizing the toxic reactive oxygen species (TROS). The present investigation clearly reveals the toxic effects imparted by the heavy metal, copper even at sublethal concentrations on the normal physiology and histology of aquatic animals in general and the fish, *Anabas testudineus* in particular.

Biography

S. Bijoy Nandan, associate Professor in Dept. of Marine Biology, Microbiology & Biochemistry, School of Marine Sciences, Cochin University of Science & Technology, India. Earlier, he worked as technical officer & head, Central Inland Fisheries Research Institute Centre, Kerala and as senior instructor (Fishery Biology) in Central Institute of Fisheries, Nautical & Engineering Training (CIFNET), Govt. of India, Cochin. He has received the Jawaharlal Nehru Award, Indian Council of Agricultural Research (1993), Best Paper Presentation Award, Indian Environment Congress (2008), Recognition Award, and Zoological Society of India. He is the technical member, Kerala State Pollution Control Board and was member, Indian Arctic Expedition in 2011. He received the US Fulbright–Nehru visiting fellowship for 2013-14 period. He is implementing several research projects funded by national and state agencies and has 135 publications in refereed national and international journals.

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