EFFECTS OF COPPER EXPOSURE ON SELECTED HAEMATOLOGY AND BLOOD CHEMISTRY PARAMETERS OF ADULT *Oreochromis niloticus* (Cichlidae).

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ABSTRACT

Present study investigates the effects of physiological stress resulting from copper exposure on Red Blood Cell Count (RBCC), Packed Cell Volume (PCV), Haemoglobin (HGB), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin Content (MCHC), White Blood Cell Count (WBCC), Plasma Cholesterol (CHOL), Total Plasma Protein (TP) and Plasma Glucose (GLU) of adult *Oreochromis niloticus*. A prior lethal toxicity test indicated the 96 hour median lethal concentration (96 hour LC50) of Cu^{++} as 0.971 ppm (confidence limits 0.915, 1.029) in soft water. Fish were acutely exposed to 0.5 ppm of Cu^{++} and blood was drawn on days 3, 6 and 9. They showed symptoms of an anaemia which included a collective depression in RBCC ($p<0.05$ on day 3, $p<0.001$ on days 6 and 9), PCV ($p<0.05$ on days 3, 6, and 9) and HGB ($p<0.05$ on days 6 and 9) and of a leucopenia by a significant decrease in WBCC ($p<0.05$ on day 6 and $p<0.001$ on day 9). Both anaemia and leucopenia were attributed to haemodilution. Persistently significant elevations in CHOL ($p<0.05$ on day 3 and 6 and $p<0.001$ on day 9) and GLU ($p<0.05$ on day 3 and $p<0.001$ on days 6 and 9) were also observed. Finally, fish were chronically exposed to 0.001, 0.01 and 0.1 ppm of Cu^{++} for six weeks and blood was drawn weekly. None of the blood indices were significantly affected ($p>0.05$) under 0.001 ppm of Cu^{++} indicating a copper level

which could not be a stressor to adult *Oreochromis niloticus*. Fish chronically exposed to 0.01 ppm of Cu^{++} only showed significant decreases in MCV ($p<0.05$ on week 3) and WBCC ($p<0.05$ on week 2) together with a significant increase in GLU ($p<0.05$ on week 1). Recovery after week 3 suggests a copper level (0.01 ppm) which is a stressor that allows acclimation. Fish chronically exposed to 0.1 ppm of Cu^{++} showed symptoms of an anaemia during the first two weeks by a collective depression in RBCC ($p<0.05$ on weeks 1 and 2), PCV ($p<0.05$ on weeks 1 and 2) and HGB ($p<0.05$ on weeks 1, 2 and 3) which could be attributed to haemodilution and haemolytic anaemia. However, a simultaneous drop in MCV ($p<0.05$ on weeks 1 and 2) occurred indicating haemolytic anaemia as the principal cause. A significant decrease in WBCC ($p<0.05$ on week 2) attributable to haemodilution was also observed. Significant elevations ($p<0.05$) in CHOL on weeks 5 and 6 and in GLU throughout the exposure were observed too. For each case of acute and chronic exposures, leucopenia was further attributed to an immunosuppressive effect of stress induced cortisol. TP was not significantly affected ($p>0.05$) by acute and chronic exposures to copper in this study. These results conclusively prove that increased copper in water is a stressor to adult *Oreochromis niloticus*.

The established normal values for the selected blood

indices may be considered as of healthy adult *Oreochromis niloticus*.