Health status of two ornamental fishes *Poecilia reticulatae* (Guppy) and *Carassius auratus auratus* (Gold fish) following exposure to therapeutic levels of Copper sulphate

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Although Copper sulphate is commonly used as a chemotherapeutant in aquaculture, its toxic effects have been reported only for some fish species under treatment conditions. The present study was conducted with a aim of assessing health status of two ornamental fish species, *Poecilia reticulatae* (Guppy) and *Carassius auratus auratus* (Gold fish) following exposure to therapeutic levels of $CuSO_4$ (0.1 mgL^{-1} and 0.3 mgL^{-1}, as Cu^{2+} for 24 hours). Survival, erythrocytic abnormalities, cholinesterase (ChE) activities of brain and muscle and histopathology of kidney liver and gills of the fish were assessed following the $CuSO_4$ exposure. Recovery status of the fish was also assessed at seven days post exposure using gold fish as the test fish. No behavioral abnormalities or mortalities were observed in both fish species treated with $CuSO_4$ during the exposure period. Fish exposed to $CuSO_4$, had significantly higher number of erythrocytes with abnormal shape and serrated plasma membrane and/or vacuolated cytoplasm compared to the to the control fishes (ANOVA, Tukey's pair wise comparison, $P < 0.05$). Nuclear abnormalities in the erythrocytes and ChE activities of muscle and brain of fish exposed to $CuSO_4$ were not significantly different from the control fishes (ANOVA, $P > 0.05$). Histological alterations observed in $CuSO_4$ treated fish were, mild to moderate levels of hyperplasia, club shaped deformities at the tip of gill lamella, curling at the tips of gill lamellae and epithelial separations in the gills; melanomacrophages in kidney (both in Guppy and Goldfish) and vacuolation of hepatocytes (in the Gold fish) at 0.3mgL^{-1} of $CuSO_4$ exposure. In Gold fish, $CuSO_4$ induced alterations in erythrocytes and histological changes could be reparable to some degree on return to aged tap water for seven days. The results revealed that when 0.1 mg/L and 0.3 mg/L concentrations of $CuSO_4$ are used as therapeutic levels for Gold fish and Guppy, precautions should be taken especially with the high concentration of $CuSO_4$ as it may lead to transient ill health conditions in the exposed fishes.

Keywords: chemotherapeutant; Copper sulphate; Guppy; Gold fish; pathology