

Histopathology of Goldfish (*Carassius auratus*) exposed to Chlorine Toxicant

Tan Chui Zhein, ¹Hassan Hj. Mohd Daud & ¹Mohd Fuad Matori

*¹Department of Veterinary Clinical Studies
Faculty of Veterinary Medicine, Universiti Putra Malaysia*

Abstract

Chlorine is widely used as disinfectant in Malaysian fish farms. As we know chlorination as a method for water disinfection is practiced by most water municipal treatment in Malaysia (Abdullah et al., 2003) due to its efficiency and cost effectiveness. Like many toxins in water, chlorine is more toxic to fish than humans (Mahjoor and Loh, 2008). Thus, the objectives of the current study were to assess pathological changes in organs, to ascertain behavioral response of goldfish when exposed to acute chlorine toxicity and to determine the Median Lethal Concentration (LC₅₀) of free chlorine. Juveniles of Oranda goldfish, *Carassius auratus*, were exposed to chlorine in a 96 hour static renewal test to determine the LC₅₀ of free chlorine. The goldfish behavioral responses were recorded. Moribund fish were promptly sacrificed and processed for histopathology. Using SPSS 16.0 probit analysis, the LC₅₀ of free chlorine in juvenile goldfish was determined to be at 0.3 ppm. Goldfish showed signs of dyspnea, lethargy and increased mucus production. Histopathologically, the gills indicated secondary lamellar edema, exfoliation of interlamellar cells' membrane and congestion in the capillary lumen. Kidney parenchyma manifested generalised degeneration, but with marked desquamation of tubules and dilated tubular lumen in the posterior kidney. Spleen showed congested blood vessels and hemosiderosis while liver showed some vacuolative changes in the parenchyma suggestive of liver necrosis. Even though the findings in gills, liver and kidney were not specific for chlorine toxicity, hemosiderosis in the spleen could be used to differentiate with other toxicities and diseases. Current findings were in agreement with earlier report by Mahjoor and Loh (2008) and also supported Zeitoun (1977) observation that the cause of death in chlorine toxicity was due to hemolytic anemia.

Keywords: Goldfish, LC₅₀ free chlorine, behavioral response, histopathology

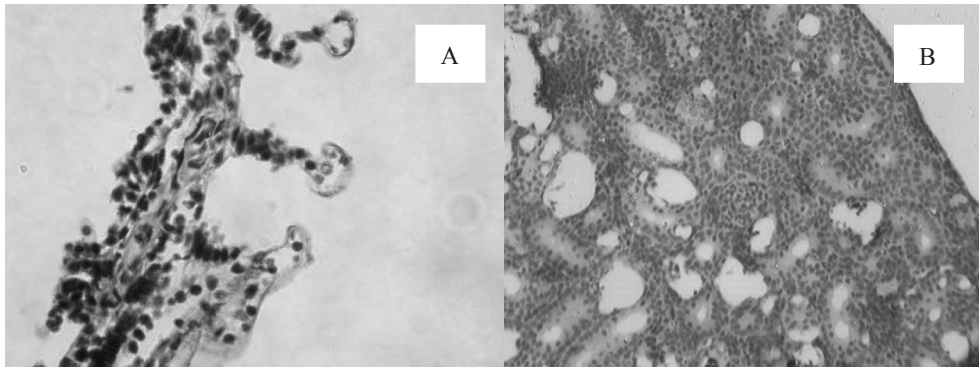


Figure 1. (A) Gills of goldfish bathed in 1ppm free chlorine showing edema at the tip of primary gills filament. (B) Posterior kidney from fish exposed to 1ppm showing formation of vacuoles of various shapes and sizes. ($\times 400$), H&E.

References

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