



“Histological modulations observed in kidney of freshwater fish *channa punctatus* exposed to cypermethrin.”

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Abstract

The Present study is aimed to assess the histological damage caused to the fish *channa punctatus* exposed sublethal concentration of synthetic pyrethroid derivative a cypermethrin. The LC₅₀ values were calculated 0.00078 mg/lit at 96 hrs exposure period. Light microscopic studies exhibited sever histological the kidney showed reduction in renal cell number in the proximal and distal collecting tubules, which have resulted in narrowness of lumen. The kidney demonstrated hyperplasia, vacuolation, degeneration and necrosis leading to the complete necrosis. The lumen of the tubules was found to be perforated. The lumen of the tubules was found to be perforated.

Keywords :- Histology, *channa punctatus*, cypermethrin, kidney.

INTRODUCTION :

Pesticides have been one of the most effective weapons discovered by man to protect agricultural products from the attack of pests. Susceptibility to chemical injury varies greatly in the tissues and cells of the same animal. It is even greater in different animals groups. However, the location of the major damage may be determined by the mode of action of the chemical. The mode of action of each poison and the toxic level of each agent at which a fairly standard distinctive pattern of tissue damage has been studied.

Increase uses of pesticides not only helped in controlling insects and pests but have created a great environmental pollution specially hazardous as aquatic fauna Brodbery and coats (1989). Generally pesticide concentrations are toxic which may be lethal or sub-lethal concentration in aquatic environment lethal concentrations cause death of the organism directly.

Cypermethrin is also regarded as hazardous, since it persists for long time in water Resepoe (1977) reported that rapid absorption of this insecticide from riverbank pond sediment and organic matter, greatly diminished its concentration in water pyrethroid insecticides show their toxic effect by inhibiting impulse transmission (Casida *et al.*, 1985) Most studies carried out with cypermethrin deal with its acute toxicity rather than its biochemical effect (Reddy and Yellema 1981).

In the present study and attempt was made to evaluate the toxic effect of cypermethrin histological changes observed in the kidney on a snake headed fish *channa punctatus*.

The experimental fish of *Channa Punctatus* were collected from the local Wadali lake around Amravati region and brought to the laboratory. They were washed with KMnO₄ solution to avoid dermal infection The fish were acclimatized to the laboratory condition for 15 days. During this period fish were fed on commercially available food for experimental purpose the pesticide mixture was prepared by dissolving sufficient amount of pesticides in 1000 ml of water. A calculated quantity of stock solution was added to the water in the experimental aquarium.

The accessory respiratory organs enable these fishes to survive out of water for a few hours or migrate from one pool to another. Air bladder is present and much elongated. The fish is carnivorous. Ophiocephalus is found in the fresh water of India, Burma, Ceylon, Malesiya, Thailand of Archipelago.

Acclimatization Methods :

All fishes of average size that is (10-13cm) and weight (13-25gm) were used. The fish were collected from Wadali Lake. The difference between largest on smallest specimens not more than (1-2 cm) length and weight (1-10 gm) when the fish are first brought in to the laboratory they were transferred to the glass aquarium and were inspected for any possible injury or infection : only the healthy fish were selected for experiment. The fish were acclimatizing for a week according to APHA (AWWA/GPCA, 1998) Standard method. The tap water was used as experimental medium for holding different tests. The test fish was fed on food available in the market excess food and fecal matter were removed from the glass, aquaria once in a day or thrice at least in weak the test fish was handle carefully so that the stress was minimum. The freshwater fish *Channa Punctatus* exposed to sublethal concentration of synthetic pyrethroid a cypermethrin. The LC₅₀ values were calculated 0.00078 µg/lit at 96 hrs exposure period.

MATERIALS AND METHODS

RESULTS

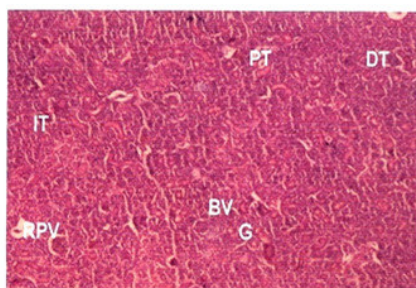
Histology of controlled kidney :

The basic unit of kidney of fish consists of a renal corpuscle, Bowman’s capsule and glomerulus and various segment of the renal tubules, namely proximal tubule, intermediate segment, distal tubule and collecting duct. Proximal tubules have prominent brush borders (Microvilli) bathed in the vascular bed in the interstitial tissues. Distal tubules and collecting ducts, both devoid of brush borders, and are sparsely distributed. The intermediate segments between proximal and distal tubules are rarely seen. The renal corpuscles are located in close vicinity of renal tubules and blood vessels in the interstitial tissue. Pigments and leucocytes are very common in the interstitial tissue.

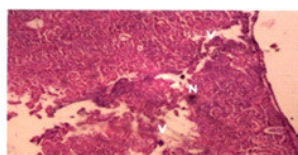
Histological Changes in the Kidney of freshwater fish *Ophiocephalus punctatus*:

The sublethal concentration of cypermethrin exposed to freshwater fish *channa punctatus*.

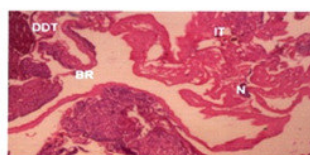
Histological the kidney showed reduction in renal cell number in the proximal and distal collecting tubules, which have resulted in narrowness of lumen. The tubular cells have undergone hypertrophy and some of the renal tubules have lost their normal shape. Vacuolation due to degeneration of cytoplasm is quite obvious. The nuclei of epithelial cells have become quite dominant and are found infiltrating into the surrounding tissue. The perforation of Kidney tubules is commonly observed. The kidney demonstrated hyperplasia, vacuolation, degeneration and necrosis leading to the complete necrosis. Cuboidal epithelial cells lining the tubules showed complete vacuolation with degenerating cytoplasm and their disorderly scattering nature. The lumen of the tubules was found to extended. Kidney tubules were also found to be perforated.



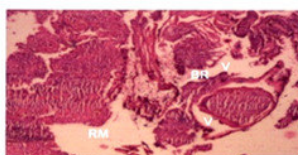
Normal



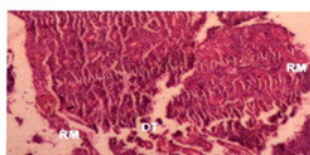
24 Hours



48 Hours



72 Hours



96 Hours

PT – Proximal Tubule
 V – Vacuolization
 RT – Renal Tubule
 DT – Distal Tubule
 G – Glomerulus
 DDT – Damage of Distal Tubule

BR – Breakage of Membrane
 N – Necrotic Martial
 RM – Rupturing membrane
 BV – Blood Vessel
 IT – Interstitial tissue
 RPV – Renal portal vein

DISCUSSION

It is evident from the results that the cypermethrin can be rated as moderately toxic to fish. In the present study, the control fish behaved in natural manner that is they were alert at the slightest disturbance, but in the toxic environment fishes showed erratic movement

The brain also indicated severe congestion and generalized spongiosis that indicate severe brain damage. This agreed with the findings of omitoyin et al., (2001). This study shows that cypermethrin is toxic to fish and causes histological changes in fish organs.

The histological examination of the kidney and brain of exposed fish indicated that the Brain and kidney were the organs most affected supporting by Aguigwo (2002) and Omitoyin *et al.*, (2006).

Necrosis and vacuolation were observed by Dhanapakiam and Præmalatha (1994) in *Cyprinus carpio* exposed to malathion. Sastry and Sharma, (1979) observed a number of striking changes in the histological structure of the kidney of *Channa Punctatus* exposed to Sub lethal concentration of 0.01 ppm of endrin for a span of 30 days and found that the shrinkage of glomerulus was the visible sign of intoxication. Konar, (1979) Shrinkage and degeneration of glomerulus and vacuolation of tubules in Carp chronically treated with heptachlor. Vinod Ghanathay, (1989) studied histopathological changes in the Kidney of *Channa punctatus*, exposed to BHC, the glomeruli were shrunken, but some of them were slightly vacuolated, there was a cloudy swelling and hydropic degeneration of interstitial tissues. Glomeruli were completely necrosis and the tubular epithelium was fibrous. Histopathological effects of insecticides on intestine of fish have been studied by several authors (Tilak *et al.*., 2005; Prashanth 2003; Thakur *et al.*., 2000).

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