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RESEARCH ARTICLE

Studies on Histopathological Changes in the Gill, Liver and Kidney of *Labeo rohita* Exposed to Quinalphos

***S. Binukumari and K. Vijayakumar**

Department of Zoology, Kongunadu Arts and Science College, Coimbatore – 641 029

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ABSTRACT

The sublethal toxicity of quinalphos on histopathology of tissues such as liver, kidney and gill was investigated in fresh water fish, *Labeo rohita* exposed to 1/10th of sublethal concentration of the chemical for a period of 7, 14 and 21 days. Though, acute exposure has not resulted in death, it led to many histological variations such as histolysis, lesions, necrosis and vacuolation etc. There are many degenerative changes in the tissues studied suggestive of impairment of normal function when compared to controls.

INTRODUCTION

The toxicity of any pollutant is either acute or chronic. The toxicant impairs the metabolic and physiological activities of the organisms physiological studies alone do not satisfy the complete understanding of pathological conditions of tissues under toxic stress. Hence it is useful to have an insight into histological analysis. The extent of severity of tissue damage is a consequence of the concentration of toxicant and time dependent. Also, the severity of damage depends on the toxic potentiality of particular compounds (or) pesticide accumulated in the tissues (Jayantho Rao, 1984). Hence, an attempt is made to study the histopathological changes of tissues gill, liver and kidney exposed to Quinalphos.

MATERIALS AND METHODS

The fish were obtained from the Department of Fisheries, Aliyar, Tamilnadu. The fish having 5-8 gms in weight and 7-10 cm in length were selected for the experiment. After the process of acclimatization and washing with 0.1% $KMnO_4$ solution, fish were exposed to sublethal concentration of chlorpyrisos for Quinalphos for a period for for a period of 7 days, 14 days and 21 days.. A parallel set without the chemical was maintained as control. Both, experimental and control fish, were sacrificed and tissues such as gill and liver were used for histopathological preparations. The slides were prepared according to standard histological procedure. The slides were studied under microscope to observe histopathological details of gill, liver and kidney.

RESULTS AND DISCUSSION

The structural alterations were observed under light microscope in the sections of gill, liver (Fig. 1 and 2) and kidney (Fig. 3) tissues of fish from treated group when compared to those from control group.

Corresponding author: binu.kumari@rediffmail.com

Unexposed fish gill histology revealed the presence of primary gill lamellae and rachis (Fig. 1). The fish exposed to Quinalphos for 7 days exposure period exhibited marked histopathological changes, such as haemorrhage at primary gill lamellae (Fig 1a). After 14 days exposure bulging of tips of gill filament were noted (Fig. 1b). The severity of the damage become more noticeable after 21 days of exposure leading to atrophy of lamellae and damage of gill septa (Fig. 1c). In fish, gills are critical organs for their respiratory and osmoregulatory functions. Respiratory distress is one of the early symptoms of pesticide poisoning (Mc Donald, 1983). T he gills are very important absorption place for the toxic compounds so the toxic compounds have a potential to cause harm to tissues and organs that contacted first (Timbrell, 1991).

In the present study, the histopathological changes in the liver of fresh water fish, *Labeo rohita* were occurred after the exposure to Quinalphos. In control, the liver tissues of Labeo rohita is composed with distinct cell walls separating the cells. The nuclei are deeply stained and centrally located (Fig. 2). Fish exposed to quinalphos showed no significant changes in 7 day exposure (Fig. 2a). As compared to control, after 14 days exposure the quinalphos has induced pathological changes in the liver tissues of fish, *Labeo rohita* (Fig. 2b). These changes include clumping of nucleus and degeneration of hepatocytes. The pathological lesions were more drastic and widespread after 21 days of exposure, there by formation of necrotic spaces and pyknotic nucleus were observed (Fig. 2c). Bhatnagar *et al.* (1988) have reported complete loss of shape of hepatocytes, necrosis and hypertrophy tendency of clumping of blood cells with enlargement of nuclei and atrophy of a hepatocytes followed by vacuolization in given of *Channa striatus* on exposure to endosulfan. The hepatic lesions with necrosis, pyknotic nuclei, vacuolation, damaged blood vessels and accumulation of cytoplasmic granules in liver were observed by Sakthivel Veena (2002). In the present study, it has been observed that the kidney of *Labeo rohita* revealed certain histopathological changes on exposure to Quinalphos for 7, 14 and 21 days. The kidney tissue of control fish is compared of glomerulus and tubule (Fig. 3). No significant changes changes

were observed in 7 day exposure period (Fig. 3a). Tubular necrosis, shrunkening of cells and damage of the chromaffin cells were some of the degenerative changes noticed in fishes exposed to quinalphos for 14 and 21 days (Fig. 3b and 3c). The kidney of fishes receives largest proportion of post branchal blood and therefore renal lesions might be expected to be good indicators of environmental pollution. Kumar Ravinder (2000) have observed various changes in the nucleus of all tubular cells, such as pyknotic nucleus and granular cytoplasm in the fish, *Channa punctatus* on exposure to ammonia. Repture of renal peritoneum, shrinkage and degeneration of glomeruli necrosis in haemopoietic tissue, clumping of nuclei in renal tubules in the kidney of Channa striatus when exposed to rogor were observed by Saxena (1993). From the present study, it is concluded that the insecticide, Quinalphos is potent to cause toxic responses, even structural alterations, in aquatic organism like fish. The agricultural effort reducing the use of pesticides and implementing natural remedies for pest encroachment can become solution for pesticide pollution.

Fig. 1. Normal gill lamella of *Labeo rohita*

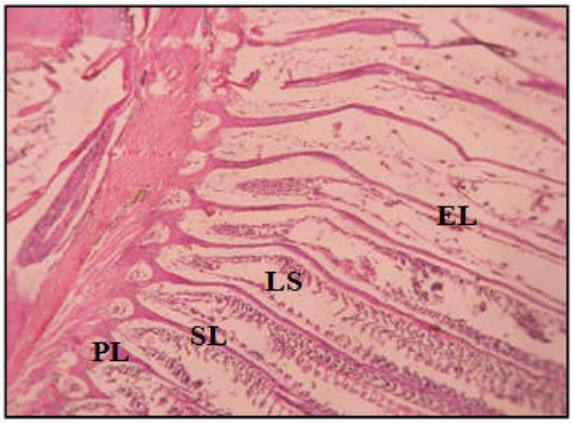

Fig. 1a. Gill lamella of *Labeo rohita* exposed for 7 days to quinalphos

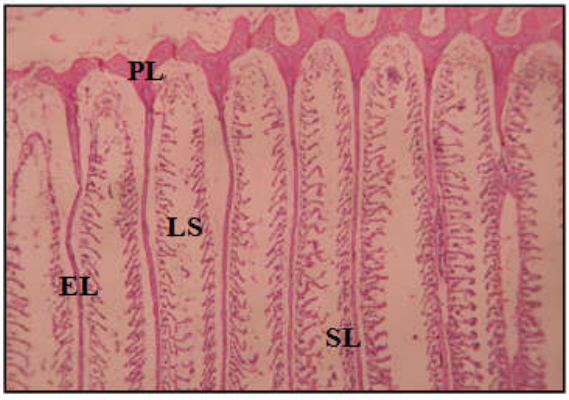

Fig. 1b. Gill lamella of *Labeo rohita* exposed for 14 days to quinalphos

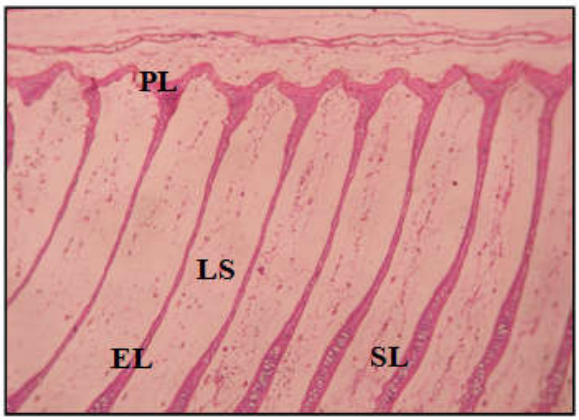

Fig. 1c. Gill lamella of *Labeo rohita* exposed for 14 days to quinalphos

PL - Primary lamellae; SL - Secondary lamellae; LS - Lamellar space; EL - Epithelial lining

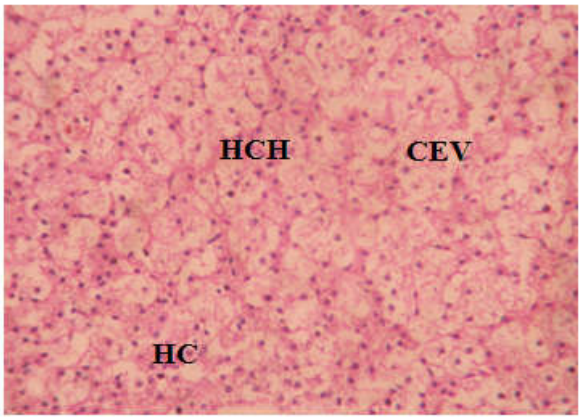

Fig. 2. Normal liver lamella of *Labeo rohita*

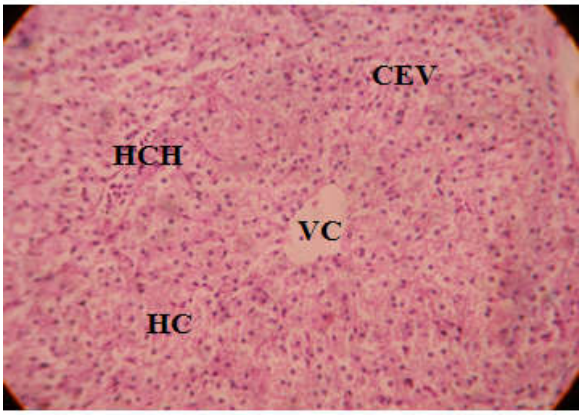

Fig. 2a. Liver of *Labeo rohita* exposed for 7 days to quinalphos

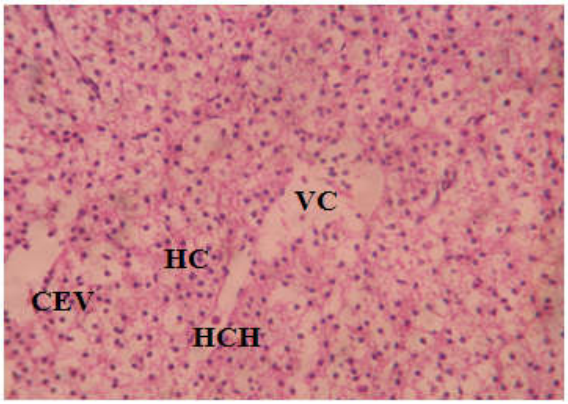

Fig. 2b. Liver of *Labeo rohita* exposed for 14 days to quinalphos

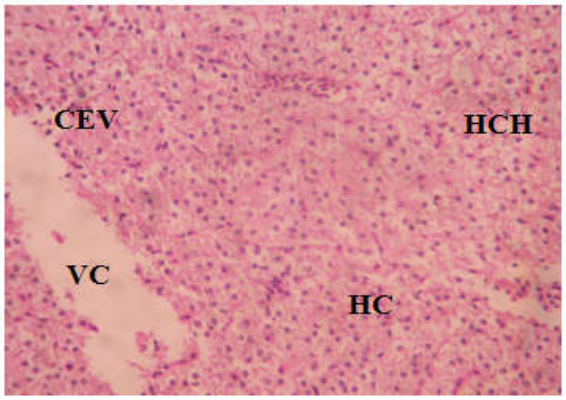

Fig. 2c. Liver of *Labeo rohita* exposed for 14 days to quinalphos

HC - Hepatocyte cells
HCH - Hepatic cords
CEV - Central Efferent Vein
VC - Vacuoles

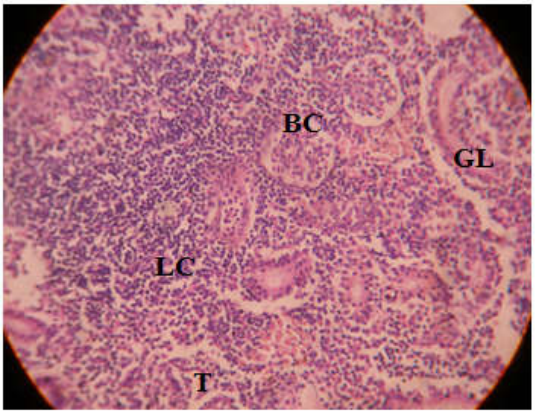

Fig. 3. Normal kidney lamella of *Labeo rohita*

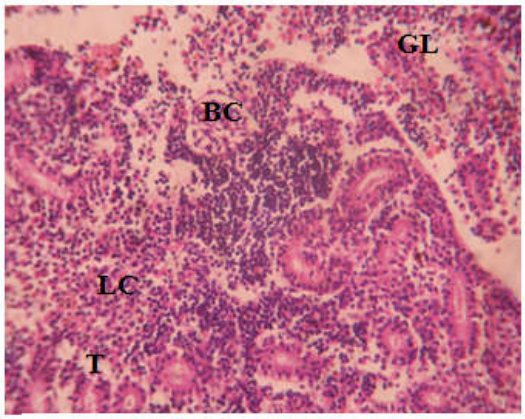

Fig. 3a. Kidney of *Labeo rohita* exposed for 7 days to quinalphos

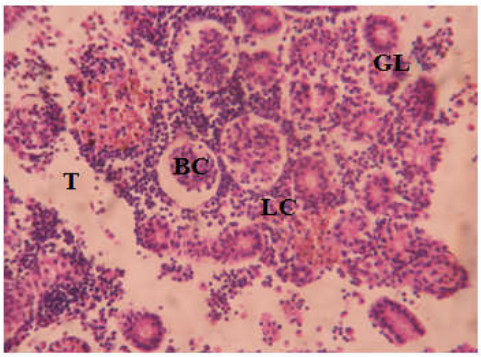

Fig. 3b. Kidney of *Labeo rohita* exposed for 14 days to quinalphos

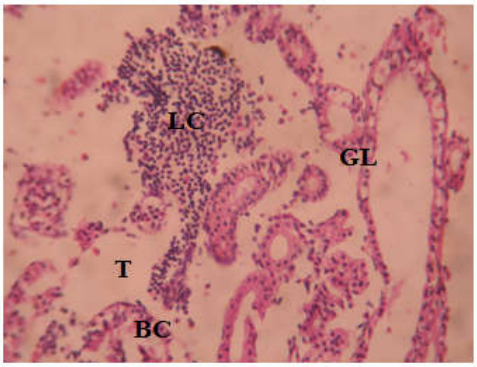

Fig. 3c. Kidney of *Labeo rohita* exposed for 14 days to quinalphos

GL - Glomeruli
LC - Lymbphoid cells
BC - Bowman's capsule
T - Tubules

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