

## HISTOPATHOLOGICAL CHANGES IN LIVER OF A TELEOST FISH *CATLA CATLA* TREATED WITH 1.2% LINDANE

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**Abstract-** The effects of the persistent environmental contaminant lindane, on the liver of a teleost fish *Catla catla* were investigated in microscopy. The liver responses were rapid, as studies shows after exposure to 1.2% lindane for 30 days. The severity of the hepatocytic alterations was prominent and these changes in hepatocyte ultrastructure could have a wider relevance for ecotoxicology, as they are correlated with the survival capacity of the fish.

For present study healthy fish specimens were collected and treated with 1.2% lindane for 15 days and 30 days. Histological studies were made by sacrificing controlled fish, 15 days treated fish and 30 days treated fish and liver were removed by dissecting them. Liver tissues were fixed in alcoholic bouins solution and proper microtome technique was applied for histological preparations and Haematoxyline/ Eosine were used for cellular differentiation. Our studies show cytotoxic as well as genotoxic effects of this pesticide intoxicification in fish *Catla catla*.

**Keyword:** Histopathological changes, cytotoxic effect, genotoxic effect, hepatic organ, lindane

### Introduction

Studies concerning the effect of pesticides on fishes have their own importance in relation with the factors increasing ecological problems and toxicity in organisms. Pesticide exposure causes severe alterations in the tissue biochemistry of fishes [4, 6, 9, 10]

The chemical stability of these compounds, their high lipid solubility and toxicity to human and animals [2], has led government and researchers to be concerned with their presence in the environment. Studies on various organs of fishes affected by pesticides, used to control insect pest population, are made by many researchers and they found positive results regarding toxicity of these pesticides in fishes.

Despite the proliferation of different types of pesticides, organochlorines such as hexachlorocyclohexane (HCH) and DDT still account for two third of the total consumption in the country [5] for agriculture and public health purposes respectively. India is now both the largest manufacturer and consumer of pesticides in South Asia.

Lindane a organo chlorine compound used to control insect pest population with proportion 1.2% of lindane and rest 98.80% of soap stone. It is used in fields as well as in residential areas for the control of insect pest population. Widespread use of lindane reports toxicity even to non target animals.

It has tendency to accumulate in soil and bodily organs, produces ailments in various organs and also cause changes at cellular level and at genetic level. It causes histopathological alterations in fish kidney, liver, gills muscles and other organs. A variety of histopathological

toxicant effects and disorders are caused due to long term effect of water contamination.

The present study was therefore under taken to describe the histopathological changes in liver of a teleost fish *Catla catla* ( belonging to order- Cypriniformes, division- cyprini, and family- Cyprinidae) produced by treating the fish with 5 gram of 1.2% lindane for 15 days and 30 days.

### Materials and Methods

Healthy specimens of the fish *Catla catla* measuring length of 12-15 c.m. and 450-500 g.m. of body weight were collected from the river Narmada and acclimatized to laboratory condition for 10 days and feeds on fish food.

On 11<sup>th</sup> day, experiment was started with mixing 5 grams of lindane in 10 liters of water. This diluted solution of insecticide is filled in an aquarium having water containing capacity of 20 liters. Selected healthy specimens were kept in this dilute solution of 1.2% lindane.

At 16<sup>th</sup> day from this experiment 5 fishes out of 10 were removed from the aquarium and scarified to remove liver. Liver were removed and fixed in alcoholic bouins solution for 24 hours. Usual microtomy technique was employed and Heamatoxyline / Eosin were used for cellular differentiation. Rest five fishes were treated for 30 days. At 31 day they were scarified to remove liver. Liver were removed and fixed in alcoholic bouins fixative for 24 hours and usual histological techniques were applied for microscopic studies.

Controlled fishes were also scarified and same procedure is applied for histological studies.

### Result and Discussion

Organochlorines continue to be the potential group of chemicals used in control of agricultural pests and vectors of diseases like malaria [3], even though many new broad spectrum pesticides have been developed in recent years. The pesticides applied on land eventually find their way to the aquatic environment, thus contaminating soil and water for several years and subsequently get accumulated in aquatic organisms [6]. The aquatic organisms like fish are able to accumulate several fold higher concentration of pesticide residues than the surrounding water [5].

As shown Figure 1, the section with normal cellular structure of the hepatic cells, obtained from the controlled fish.

Histopathological the changes after treatment with the pesticide included swollen and ruptured parenchymal cells, loss of cord structure, vacuoles filled with cellular debris, focal necrosis, and a significant increase in Kupffer cells.

As it is clear in Figure 2, 1.2% lindane intoxication to fish *Catla catla* results in 15 days. There are mild disarrangement of cells (MDC) in hepatic tissues with ruptured cell wall, and vacuolation (V) of cells with Moderate hypertrophic cells (MHC) in hepatic tissues showing structural modification.

Figure 3 shows intoxication to fish results in 30 days. Chronic response is very obvious showing mild disarrangement of cells (MDC) with increased vacuolation (V) of cells filled with cellular debris and clumping of cells (CC). Lightly stained condensed chromatin (LSCC) in figure 3 shows result of genotoxic effect of lindane.

However, pesticide exposure causes severe alterations in the tissue biochemistry of fishes [4, 6, 10, 9]. The liver, a vital organ of carbohydrate metabolism was drastically affected by fenvalerate [1]. Depletion of glycogen content was observed in their work.

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Fig. 1- Showing normal polyhedral hepatic cells

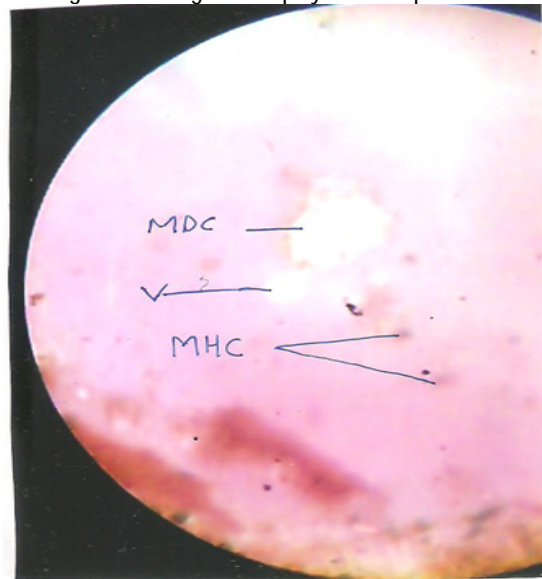


Fig. 3- Showing effects of lindane intoxication to the fish *Catla catla* within 30 days of the experiment.

MDC- Moderate dearrangement of the cell

V- Vacuolation of the cells; CC- Clumping of the cells; LSCC- Lightly stained condensed chromatin

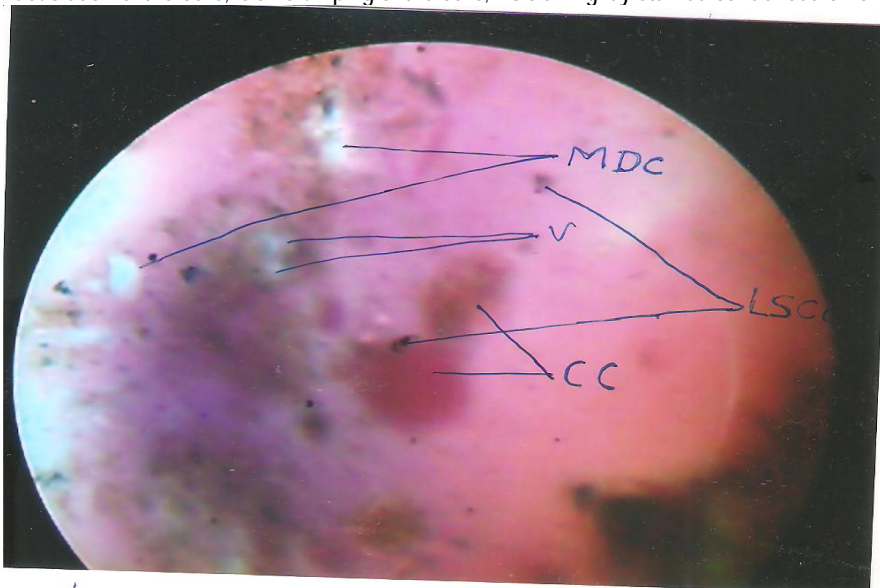


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