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HISTOPATHOLOGICAL EFFECT OF SEDAXANE, A PESTICIDE ON THE LIVER OF A TELEOST *Channa gachua* (BLOCH)

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ABSTRACT
The present work deals with histopathological alterations that have occurred on the liver of an air breathing teleost *Channa gachua* (BLOCH) after getting an exposure to sedaxane. Fish were exposed to 0.045 ppm (sublethal concentration of sedaxane for 96 hours) and light microscopically studies were made. It showed the oozing of blood from the capillaries, congestion of blood vessels, vacuole formation, vasodilatation, fatty changes and hypertrophy. The result showed that sedaxane was very toxic to the *Channa gachua* as it had caused noticeable degenerative changes in fish organs like liver.

KEYWORDS: Histopathology, liver, *Channa gachua*, sedaxane, toxicity.

INTRODUCTION

Agriculture contributes 33% of GDP and hence more emphasis has been given to control the pests, so that the crop production could be increased. Most of the people related with agricultural activities are not so educated and hence they don't understand the harmful effect caused by pesticides from agricultural area affecting the aquatic ecosystem day by day (Austin, 1999). Due to bioaccumulation the amount of toxic material gradually increases in each successive level of food chain and hence, it is very harmful to the organisms of the higher trophic level like human being as they consume fishes contaminated by pesticides which damage the body or body parts (Svensson *et al*., 1994; Kumar *et al*., 2007). In rural areas fisheries is also one of the important parts of employment and economical source. To know the impact of toxicants histopathological investigation become a most important tool which works as a biological marker that helps us to estimate the toxicity condition on cellular or tissue level (Jayantha Rao *et al*.,1985; Srivastava *et al*., 2008). Indra Pala *et al*., 2008 showed the path of cupric chloride intoxication to the aquatic media. Hajarika *et al*., 2003 showed the inhibition of acetylcholine esterase enzyme due to organophosphate intoxication to the water bodies. It results in overstimulation of muscarinic and nicotinic receptor. Management of severe poisoning is difficult and hence requires intensive care (Eddleston *et al*., 2005; Ally and El-Gendy, 2000; Mansour and Mossa, 2011). Degradation of these toxicants in nature is quite slow (Nikam et al, 2011). Liver is the most important organ as it performs several functions at a time and playing a prominent role in metabolism of carbohydrates, proteins, lipids, storage of glycogen, synthesis of amino acids, secretion of bile and also in detoxification. Any damage to it may lead to a number of functional disturbances. Thus the present investigation has been undertaken to know the toxic effect of sedaxane on the liver of *Channa gachua*.

MATERIALS & METHODS

Adult healthy specimen of *Channa gachua* (BLOCH) measuring 7-10 cm in length and 10 to 12.5 gm were taken without any differentiation on the basis of their sexes from the low lying paddy field of Mehsi, East champaran, Bihar. After collection, fishes were transported to the laboratory in aerated containers and then they were treated with 0.5% $KMnO_4$ solution for 10 minutes to the dermal contamination. Now the fishes were allowed to acclimatize in a tank for 15 days and fed with chopped earthworms, tube feet or fish tone. The water was renewed after every 24 hours to maintain dissolve O_2 concentration. 15 healthy fishes were taken both in control and treated tanks. During the experimentation no food was given to them. Important parameters for maintaining the fish were strictly followed by as par condition recommended by APHA, 2005. After the exposure the vital tissue like liver was isolated from the control and experimental fish and they were cleaned and fixed by using saline solution. Liver was kept in formaldehyde for 24 hours and then dehydrated, embedded in paraffin wax and then they were sliced by using microtomes of thickness 5 micrometre. They were stained by using double staining technique (Haematoxylin and Eosin) and viewed under the compound microscope.

RESULTS & DISCUSSION

The fish liver consisting parenchymal cells or hepatic cells and remain covered with a tough serous membrane as it is richly supplied with blood and hence gets affected very much due to the toxicants present in water. The finding matches with the work carried by Camargo and Martinez, 2007. It is also a main storage and metabolic organ (Reddy, 2012). The liver of control fish showed normal and uniform distribution of parenchymal cells without any abnormality. Cells are round in shape, polygonal in structure with clear spherical nucleus having large quantity of lipid glycogen granules in their cytoplasm (figure 1, 2 and 3).

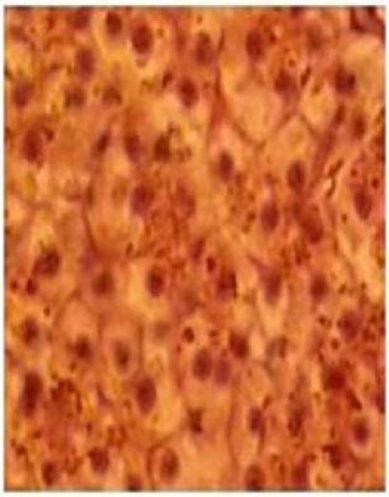

FIGURE 1. Control liver showing normal distribution of hepatic cells (H/E×200).

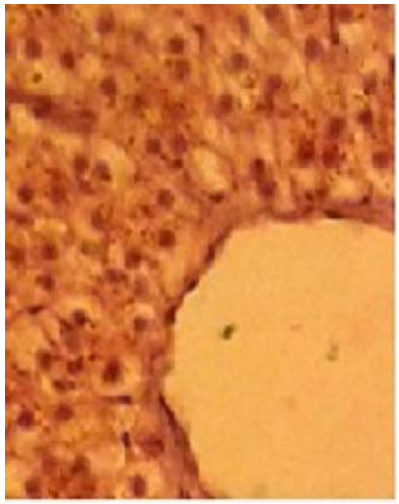

FIGURE 2. Control liver showing polygonal cells with central vein (H/E×400)

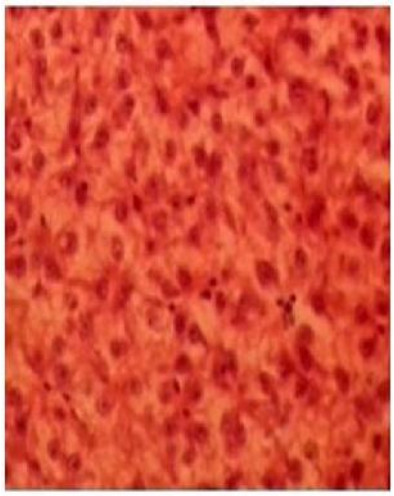

FIGURE 3. Control liver showing large cells with uniform cytoplasm (H/E×200

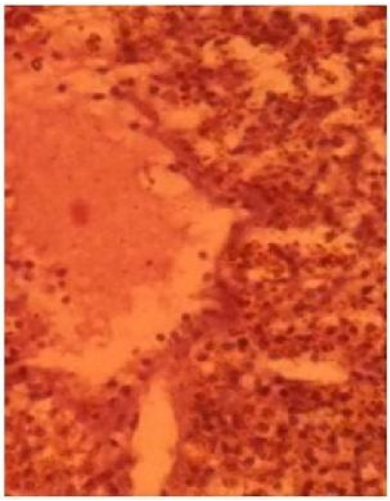

FIGURE 4. Sedaxane treated liver showing breakdown of blood vessels and haemorrhagic area (C/E×400)

FIGURE 5. Sedaxane treated liver showing necrosis of hepatic cells and degeneration of cytoplasm (H/E×200)

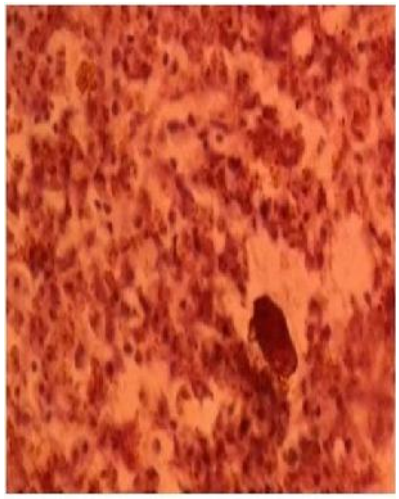

FIGURE 6. Sedaxane treated liver showing breakdown of hepatic chord and vacuolization (H/E×400)

After following the treatment with sedaxane, the fish liver showed several histological alternations like break down of blood vessels and subsequent formation of haemorrhagic area (figure 4), necrosis of hepatic cells on the degeneration of cytoplasm (figure 5) and disorientation of hepatic chord, vacuolization of some places are also seen (figure 6). Butchiram and Tilak (2009) also found the necrosis in the liver cells of the fish *Channa punctatus* when exposed to Alachlor. Cytoplasmic vacuolization in the liver of *Tilapia zilli* after the exposure of aluminium was found by Hady and Alwan, 2012. Velisek *et al*., 2009 also found vacuolization in cytoplasm of liver tissue in bifenthrin treated *Oncorhynchus mikiss*. Doaa and Hanan, 2013 reported macrophages aggregation in lead treated liver of *Oreochromisni loticus*. The findings of present study also matches more or less with the work of Muthukumaravel *et al*., 2013 who studied the impact of monocrotophos on the liver of *Labeo rohita*. In the cadmium chloride treated liver of *Clarius batarachus* hepatocytes degeneration were reported by Ahmad *et al*., 2011. Kadry *et al*., 2012 worked on the liver of *Clarias gariepinus* exposed to atrazine and found similar result.

CONCLUSION

After going through above result and discussion it can be concluded that sedaxane reaches the liver through the internal circulatory system and might have impaired cellular functions. The disorientation of cells and their functional incapability increases with an increase in exposure duration and toxic concentration. The necrosis, vacuolization and breakage of hepatic chord might be a reason of decreased metabolic activity, activeness of body which ultimately leads to the death of fish. Hence the indiscriminate use of pesticides not only harms the aquatic organisms but other organisms of higher trophic level too.

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