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DICHLORVOS'S HISTOCHEMICAL IMPACT ON PROTEIN AND CARBOHYDRATE IN HEPATOPANCREAS OF CYPRINUS CARPIO

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ABSTRACT

With a view to examine the effect of dichlorvos on hepatopancreas, we conducted a pilot experiment on a fish named *Cyprinus carpio* taking two concentrations of dichlorvos, viz. 2.5 ppm and 4.5 ppm for two different periods, ten and twenty days, respectively. Histochemical analysis carried out using periodic acid schiff's reaction and mercury bromophenol blue after Animal Tissue Techniques by Gretchen L. Humason, showed decrement in general carbohydrate content and increment in protein content in response to the pesticide treatment. Decrease in carbohydrate content might be attributed primarily to metabolic stress while increment in protein content might show recuperation against the pesticide.

KEYWORDS: protein, carbohydrate, dichlorvos, histochemical.

INTRODUCTION

Pesticides play a pivotal role in the production of crops by the peasants. Peasants are using them indiscriminately; sometimes alone or sometimes in combination with other pesticides on their crops in higher doses to gain maximum output. Hardly there is a single crop on which pesticides have not been used, be it cereal, paddy, gram, soybean, mango, litchi, etc. These pesticides through food chain accumulate in different animals such as fish, birds and even humans causing various diseases. Numerous pesticides have been traced from the human milk[1,2] meaning the newborn baby is fed pesticides from birth. Hens that are exposed to dichlorvos showed delay in egg laying and decreased content of protein and cholesterol level in the yolk.[3] There are numerous instances of dichlorvos poisoning. Numerous works have been carried out in search of the possible impact of pesticides on different organisms. Present study is undertaken to analyze the impact of dichlorvos on the nutritional value of fish.

MATERIAL AND METHOD

The healthy and medium sized fishes were collected from the local water reservoir with the help of fishermen for the experiment. After washing with 1% $KMnO_4$. They were grouped into three groups, viz. one control and the two other treated with 2.5 and 4.5 ppm dichlorvos. Periodic acid Schiff's reaction and bromophenol blue tests were conducted as described in Animal Tissue Techniques by Gretchen L. Humason.[4]

Periodic Acid Schiff's Test for Carbohydrates

Table 1: Control.

Part of hepatopancreas	Observations
Pancreatic tissue, Blood cells	Strong positive
Hepatic cells	Moderate positive reaction
Interhepatic spaces	Positive
Most of the cells, Cytoplasmic inclusions	Negative

Table 2: 10-days exposure to 2.5 ppm DDVP.

Part of hepatopancreas	observations
pancreatic tissues and blood cells	moderate positive
hepatic cells and intrahepatic inclusions	weak positive
Nucleus of all hepatic cells	moderate positive reaction

No further reduction was seen in the carbohydrate content subsequent to 20-days intoxication except few spots of liver mass showing weak positive reaction.

10-days exposure to 4.5-ppm dichlorvos resulted in reduction of carbohydrate contents in the central part of the liver, while other parts exhibited results similar to 2.5-ppm intoxication.

Table 3: 20-days exposure to 4.5-ppm dichlorvos.

Part of hepatopancreas	Observations
Pancreatic tissues	Moderate positive
Hepatic cells	Weak positive
Other cellular structures	No reaction
Result	**Further loss of carbohydrate**

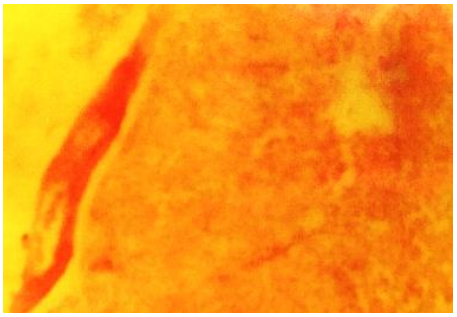

Fig. *1:* Photomicrograph of T.S. of Liver of control *Cyprinus carpio*, 100X.

Fig. *2:* Photomicrograph of T.S. of the Liver of Cyprinus carpio following exposure to *2.5-ppm dichlor*vos, *10 days, 100X*.

Fig. 3: Photomicrograph of T.S. of the Liver of Cyprinus carpio following exposure to 4.5-ppm dichlorvos, 20 days, 100X.

Bromophenol blue test for general proteins

Table 4: Control.

Part of hepatopancreas	Observations
Nuclei of hepatic cells Pancreatic tissue, Interhepatic spaces	Strong positive
Blood vessels, Blood cells	Positive reaction
Cytoplasm of hepatic cells, Reserve material	Negative

Fishes treated with 2.5-ppm dichlorvos for ten days revealed decrement in Hepatic and intrahepatic cells' protein content (fig. 5).

Table 5: 2.5-ppm dichlorvos for 20-days.

Part of hepatopancreas	observation
nuclei of hepatic cells, blood capillaries	strong positive reaction
cytoplasm	moderate positive
Result	**Increment of protein**

With 4.5-ppm 10 days treatment, protein contents increased in all cells in comparison to control one, following twenty days exposure, few patches of liver lost protein and showed moderate positive reaction instead of strong positive reaction (fig. 7).

Fig. *4.* Photomicrograph of T.S. of the liver of control *Cyprinus carpio* (bromophenol blue test), 100X.

Fig. 5: Photomicrograph of T.S. of the liver (10-days), Cyprinus carpio, 2.5- ppm dichlirovos 100X.

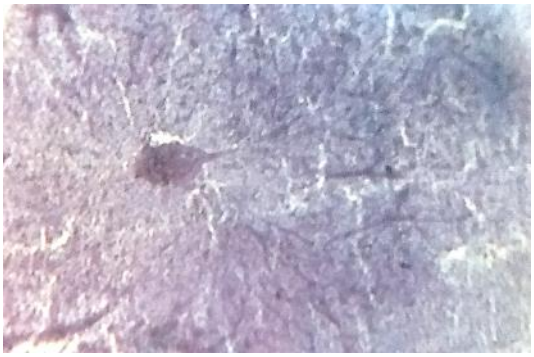

Fig. *6.* Photomicrograph of T.S. of the liver of Cyprinus carpio following 20-days exposure to 2.5-ppm dichlirovos (bromophenol blue test), 100X.

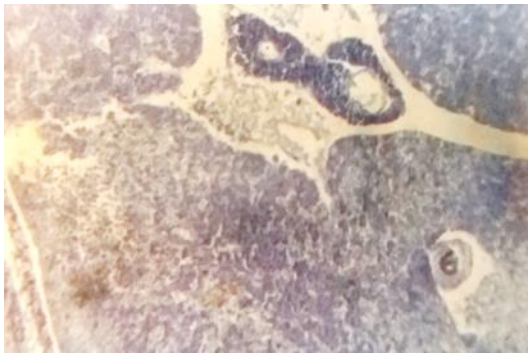

Figure 7: Photomicrograph of liver's T.S. of Cyprinus carpio after 20-days exposure to 4.5-parts per million dichlirovos (bromophenol blue test), 100X.

Our experiment clearly demonstrated that general carbohydrate content decreased at both the concentration and period of time while overall protein content increased in response to dichlorvos toxicity. High fluctuations in the content of glycogen in *Oreochromis niloticus* liver was detected as the result of a metal deposition in hepatopancreas, but a favorable response close to the portal vein using PAS by.[5] The same author, by the use of bromophenol blue technique found an increase in general protein content in both the tissue of hepatocytes and hepatopancreatic acini. This finding is in consistent with our findings. By the same method, the amount of glycogen and total protein in the liver cells of *Channa striatus* and *Channa punctatus* has been found to be much lower[6] [7] have found that after thirty days of exposure to sublethal quantities (1.9% and 0.95%) of paper mill effluent, the liver of *Rasbora daniconius* gradually loses its protein, lipid, and glycogen content due to the presence of *Sudan* black B, Bets's Carmine, and mercury bromophenol blue (Hg-BPB).[8] found that exposure to several sublethal amounts of textile mill effluents significantly reduced the amount of protein and carbohydrates in Cyprinus carpio's muscle, liver, and intestine.

After receiving cadmium sulphate for 10 and 20 days, it was discovered that the liver's protein and carbohydrate content reduced in a dose-dependent way as concentration increased.[9]

CONCLUSION

Experiment demonstrates that fishes underwent metabolic stress resulting in the exhaustion of carbohydrate content a lot but at the same time increment in protein content indicates the recuperation from metabolic stress. In this process, the nutritional value of fishes diminished. This research may have a great impact using pesticide on crops that might prove detrimental for fish as fish is eaten by the poor.

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