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Malathion Induced Alterations in Liver of Major Carp Labeo Rohita

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ABSTRACT

Malathion is an insecticide of group organophosphorus showing strong insecticide properties accompanied by low toxicity for vertebrates. The present study shows the malathion induced alterations in the biochemicals of liver of major carp Labeo rohita exposed to sublethal dose for 30 days. Glycogen, Protein and Cholesterol of liver was estimated on 10th, 20th, and 30th day. The liver glycogen was found to be depleted significantly after 10 and 20 days of exposure. However, it increased after 30 days. Liver protein was elevated after 20 days of exposure, but after 30 days of treatment it depleted significantly. The fish exhibited elevated liver cholesterol during the exposure of 30 days.

Keywords: Malathion, Labeo rohita, Glycogen, Protein, Cholesterol.

I. INTRODUCTION

Pesticides are substances intended for preventing or destroying pest. It may be a chemical or biological agent used against any pest. Although there are benefits of use of the pesticides, some also have drawbacks such as potential toxic to humans and other animals. Pesticides are one of the most alarming toxic substances that are deliberately added to our environment. But it is matter of concern that along with the pest they prove harmful to many other living beings. Pesticides which are commonly used in India are those belonging to the organophosphorus groups, carbamates group, organochlorines and pyrethroid.

In recent year organophosphorus has gained importance due to ban on organochlorine groups i.e. DDT, Aldrin, Lindane and endosulfan. These pesticides have a tendency to persist and have potential to bioaccumulate in the body (Kamein M.A 1997). Malathion is an insecticide of group organophosphorus showing strong insecticide properties accompanied by low toxicity for vertebrate. Metabolism of malathion in bodies of vertebrates and invertebrates in complex. As a result of metabolic changes with contribution of phosphatase and carboxy esterase, many metabolites are produced (malaoxon) of varied toxicity, which may be reflected by the level of cholinestarase inhibition.The greatest accumalathion of pesticides in liver and kidney seen after intravenous administration to albino rat followed by an oral and dermal administration. Marrs TC etal. (2002).

II. MATERIAL AND METHOD

Fish - The major carp weighing about 125+2 gm were selected for the present study and were collected from state government fish farm Mahan (dist. Akola) and were disinfected in 1% $KMnO_4$ solution to avoid dermal infections. The dechlorinated aged tap water was used in the experiment. A static model ecosystem was established in the laboratory glass aquaria. Fish were fed with common fish food once a day in the morning at about 10:00 am.

Observation was made for 24 hrs. from which different concentration was selected for full scale experiment. Experiment was conducted with 25 lit. of pesticides treated water containing 10 starved fishes. The intermediate sets of concentration were prepared. LC 50 was calculated. The sublethal dose of malathion (0.5ppm) was determined to conduct final set of experiment. Final experiment has 2 group of fishes.

Group 1: Consist of control fishes (*Labeo rohita*, maintained in aged tap water in large aquarium.

Group 2: Consist of 10 experimental fishes (*Labeo rohita*) exposed to sublethal dose of malathion. During the experimental period of 30 days the water was continuously aerated. Fish were feed with mixture of rice bran and groundnut oil cake in the morning at about 10:00 am. Experiment were replicated and data was subjected to statistical analysis for students test.

Fishes in each group were used to study various biochemical parameters in liver. Liver was dissected out and washed in chilled fish saline, weighed and homogenized. Homogenates were prepared in different media as per the requirement of the techniques involved.

Glycogen, protein and cholesterol were estimated in control as well as experimental fishes. All the results of biochemical studies are expressed as means plus or minus SE of the means. Statistical analysis were carried out using student t test. The differences were considered statistically significant when $P < 0.05$.

III. RESULTS AND DISCUSSION:

TABLE 1

Alteration in liver biochemicals of the fish, *Labeo rohita* following exposure to sublethal concentration of malathion for 30 days.

Parameters	Control	Days		
		10	20	30
Glycogen (mg/g)	15.61 ± 00.28	10.29* ± 0.16 (-34.09)	13.16* ± 0.42 (-15.70)	18.66* ± 0.86 (+19.53)
Protein (mg/g)	131.86 ± 04.68	121.24^{NS} ± 3.29 (-8.06)	196.40* ± 8.15 (+48.94)	74.72* ± 1.82 (-43.34)
Cholesterol (mg/g)	76.95 ± 01.24	89.72^{NS} ± 4.28 (+16.59)	124.00* ± 2.66 (+61.14)	137.55* ± 2.16 (+78.75)

Values are mean ± SE of 5 individual observations

Values in parenthesis are percent change over control

*Values are significant of 5 % level ($p<0.05$); NS- Not Significant.

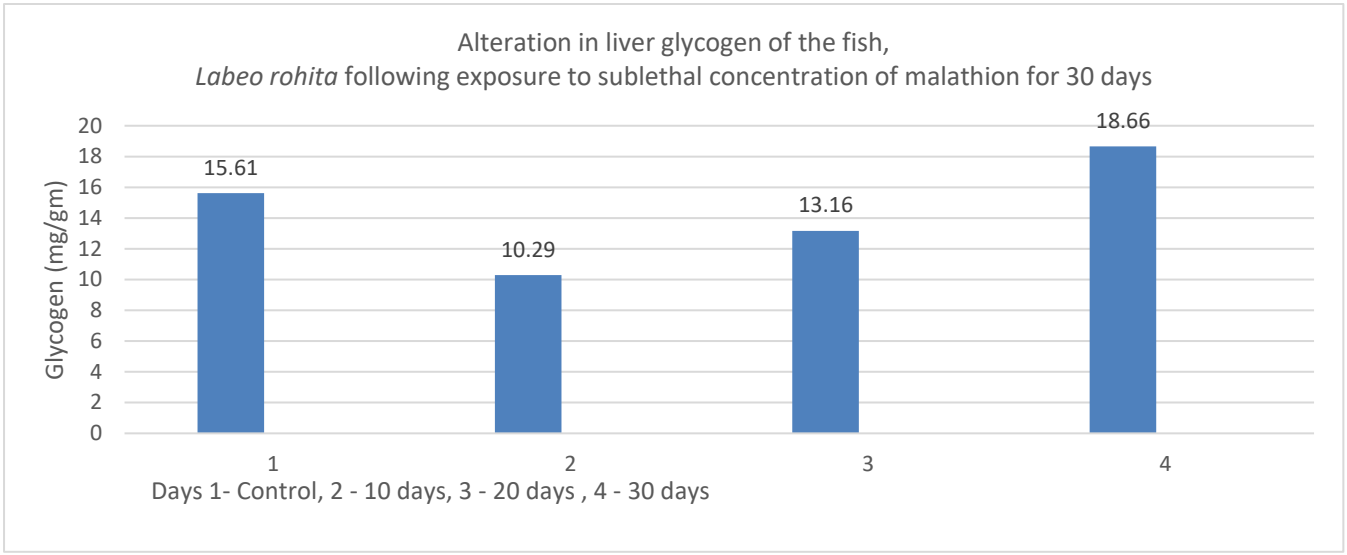

Fig 1.

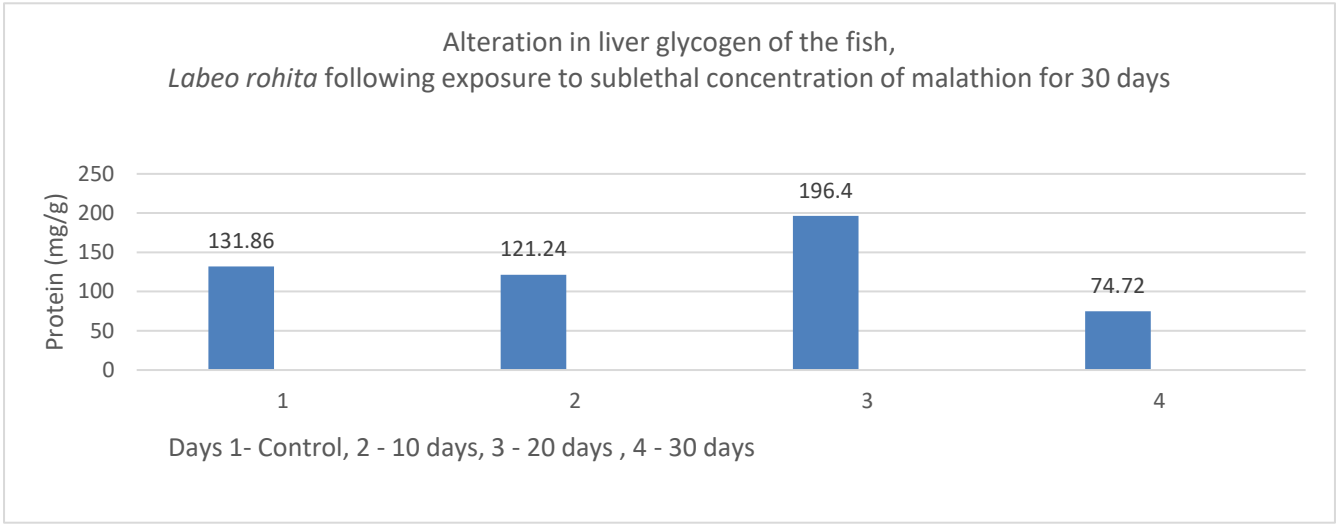

Fig. 2

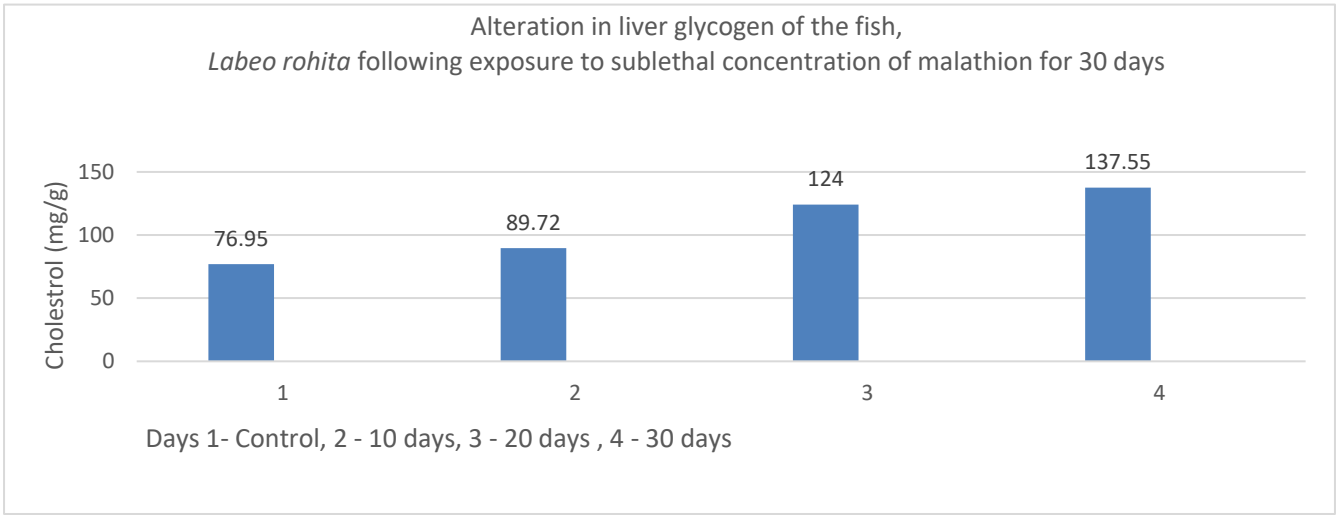

Fig. 3

Glycogen, protein and cholesterol was estimated in fish *Labeo rohita* after exposure to sublethal dose of malathion for 10, 20 and 30 days. The liver glycogen content was found to be depleted significantly after 10 and 20 days of exposure ($P< 0.05$). The depletion was 34.9% after 10 days and 15.7% after 20 days of exposure. However, a significant elevated level of glycogen was found after 30 days of exposure.

Liver protein were found elevated tremendously after 20 days of exposure (48.94%) but after 30 days of treatment there was a significant protein depletion in liver registering -43.34% over the control.

The fish exhibited elevated liver cholesterol content.

The decreased glycogen content in liver indicate that, liver, a vital organ of carbohydrate metabolism was adversely affected by malathion. Fish liver is a primary organ for detoxification and hence is expected that toxicants would reach there in abundance for detoxification and disposal. Dezwaan and Zandee (1972) stated that an overall decrease in glycogen levels in the tissues might be due to prevalence of hypoxic/anoxic conditions, which are known to increase carbohydrate utilization.

After 20 days of exposure there was a highly significant increase in the liver protein. The increase of protein content reflects simultaneous protein synthesis of detoxification enzymes at the expense of glycogen to meet additional energy requirements in synthetic activity of tissue.

The observed increase in cholesterol in the liver may be due to increased mobilization of fat and transport to the liver. The present result are in agreement with those of (Dezwaan and Zandee,1972 ; Vasanthi et.al;1990 ; Datta et. Al 1993 and Oluch 1999).

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