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Research Article

EFFECT OF MALATHION ON ACID PHOSPHATASE ACTIVITY OF FRESH WATER FISH *CHANNA PUNCTATUS*

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ABSTRACT

Malathion is commonly used insecticide for agricultural and non agricultural purpose in India. The acid phosphatase activity of liver and muscle of fresh water fish *Channa punctatus* was studied after exposure to sublethal concentration of malathion. There is significant decrease in acid phosphatase activity of liver and muscle in treated group compared with control.

Keywords: Malathion, *Channa pucntatus*.

INTRODUCTION

The freshwater is polluted due to entry of excess sewage water, industrial effluents and large number of pesticides in natural and agricultural pest management. The pesticides like organophosphate, organochloride and carbamate are regularly used in agricultural pest management for food production but through their excessive and indiscriminate use in agricultural pest management and public health operations. The rapidly increasing use of insecticides in agriculture posses serious hazards to aquatic animals.

The changes in enzymatic system may alter the metabolic processes. More recently changes in enzymes concentrations are being employed in the evaluation of toxicological responses. Toxicologists have developed interest in studying the responses of individual enzymes or groups of enzymes to toxic insult. Several reports are available on the effect of insecticides on different aspects of metabolisms.

Enzymes play an important role in metabolism. They are exceeding efficient and very specific in terms of nature of reaction catalyzed and the substrate utilized. They synthesis and final concentration of enzyme is under genetic control and is greatly influenced by very small molecules of substances. These cellular catalysts control the formation of biochemical intermediates essential to all physiological functions. Hence, changes in enzyme levels are one of the fundamental steps to assess the effects of toxicants.

Due to their lower persistence in the environment, organophosphates are used judiciously to control a wide variety of agricultural pests as well as ectoparasites in fish in aquaculture. However, the uncontrolled use of these pesticides in agriculture and public health operations has increased the scope of ecological imbalance and thus many non-target organisms have become victims. Among the aquafauna, fish form an important group due to their nutritive value. Therefore, it becomes a matter of great concern when aquatic pollution due to pesticides is discussed.

Many authors studied effect of pesticide on acid phosphatase activity in fish (Joshi and Desai, 1981; Jaroli and Sharma, 2005; Sreenivasan *et al.* 2011). However, very little information is available on the alterations in enzyme activities due to malathion in the *Channa punctatus*. In present investigation attempt has been made to study effect of malathion on acid phosphatase activity in liver and muscle of *Channa punctatus*.

Table 1: ACP contents of the liver and muscle of *Channa punctatus* after exposure to sublethal concentration of malathion

Tissues	Control	24h	48h	72h	96h
Liver	160.45±2.15	155.89±1.39	149.21±2.33	143.25±2.11	139.22±1.89
Muscle	467.59±2.36	458.25 ±2.57	451.22±2.29	441.15±1.25	432.17±2.27

- Values are expressed in μ**m phenol/mg protein/h.**
- Each value is the mean of six individual observations

MATERIAL AND METHODS

The fish *Channa punctaus* were collected from local river Godavari Dist-Nanded and brought to laboratory. These fishes were observed for any pathological symptoms and then placed in 0.1% potassium per magnate ($KmNo_4$) for two minutes so as to avoid any dermal infection. The fishes were then washed with water and acclimatized to laboratory conditions for two weeks in glass aquaria of 100L. During acclimatization the fishes were provided with a diet consisting of live earthworms on alternate day. Food supply was withdrawn 24 hrs prior to experimentation. A commercial grade of pesticide Malathion 50% EC was used for bioassay test. A stock solution of toxicant was prepared and few concentrations from stock solution were prepared as per the dilution technique (APHA, 1998).

For experimentation, laboratory acclimatized fishes were divided into two grows of 10 fishes per aquarium. Group 'A' served as control kept in tap water. Group 'B' was exposed to sub lethal i.e. ($1/5^{th}$ of LC_{50} of 96 hours i.e. 0.8 ppm) concentration of malathion solution. Experiments were carried out up to four days. Water was renewed during every 24 hours in order to provide fresh oxygenated water and also to maintain the concentration of malathion.

The fishes were scarified immediately at the end of 24, 48, 72 and 96 hours in both groups. Tissues like musclel and liver were excised rapidly and processed for the biochemical estimation. The cleaned and pooled tissues were homogenized using double distilled water and centrifuged at 3500 rpm and used for analysis. The activities of the enzymes were assessed by using methods as given by Butterworth and Probert (1970). Control and blanks were run simultaneously and optical density was measured at 410 mm.

RESULT

The acid phosphatase activity in the liver and muscle tissues after exposure to the malathion showed in table-1. The acid phosphatase activity in liver and muscle tissues showed significant decrease after exposing *Channa punctatus* to malathion for four days.

DISCUSSION

The contamination of water by widely utilized organophosphorus insecticide such as malathion is a potential problem for fishes.

Decrease in ACP and ALP activities in liver muscle and kidney and increase in ALP activity in liver and muscle may be due to the uncoupling of hosphorylation by the insecticide; decrease in ACP and ALP activities in hepatopancrease and foot may be due to the uncoupling of phosphorylation by the insecticide; Deshpande *et al.* (1999).

Decrease or increase in the enzyme activity represents the stress in any organism that results in metabolic burden. (Hansen, 1992) In the present study, the enzyme activity in acid phosphatase was estimated in *Channa punctatus*.

Ahmed *et al.*(1997) studied the effect of copper on oxygen consumption and phosphatase in *S.serrata* and concluded that there was decrease in alkaline phosphatase activity in muscle, hepatopancreas and haemolymph. Similar observations were noted by in the same crab in response to naphthalene. (Elumalai, 1998) In the present investigation, the activity of alkaline phosphatase was found to decrease in the experimental fish when compared with that of the control fish.

ACP acts as marker enzyme for the detection of lysosomes in cell fractions and can be altered by the presence of xenobiotics (Cajaraville *et al.*, 2000). Galdhar *et al.* (1978) reported inhibition of this enzyme's activity in rats due to various insecticides.

Bhatnagar *et al.* (1996) observed decrease in acid phosphatase activity in liver and muscle of *larias batrachus* on exposure to a pyrethroid for 30 days. Borah *et al.* (1996) noticed significant decline in the activities of acid phosphatase of *Heteropneustis fossilis* on exposure to rogor. The decrease in acid phosphatase activity may be due to histopathological changes such as necrosis. It may be due to decrease in the rate of trans phosphorylation. Dalela *et al.* (1960) are also on the opinion that uncoupling of oxidative phosphorylation has been the main reason for inhibition of acid phosphatase.

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