

# MODULATION IN GLYCOGEN OF THE FRESHWATER FISH *OPHIOCEPHALUS PUNCTATUS* EXPOSED TO CYPERMETHRIN

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## KEY WORDS

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## ABSTRACT

The effect of cypermethrin on glycogen in liver and intestine of *Ophiocephalus punctatus* exhibited notable alterations. Liver and intestine being the main site of metabolic activity in body was selected for the study purpose. The sub lethal concentration of cypermethrin treated with *Ophiocephalus punctatus* at different time interval and in the treated liver and intestine, glycogen content showed declined trend.

## INTRODUCTION

Pyrethroids insecticides, including cypermethrin are widely used for the control of insect pests all over the world to increase the production of food grain and other agricultural products. It may also be used in public health applications to control insects such as cockroaches, mosquitoes, ticks and flies which may act as a disease vector. Pyrethroids are several orders of magnitude more toxic to fish than organophosphate pesticides they are replacing in many agricultural, commercial and residential applications (Oros *et al.*, 2005).

The intake of insecticides affects the biochemical composition of fishes (Jebakumar *et al.*, 1990; Sultatos, 1998; Kumble and Muley, 2000; Prasad *et al.*, 2002). It has been shown by many scientists that insecticides mainly affects liver of fishes (Murty and Devi, 1982; Anthony *et al.*, 1986; Bhushan *et al.*, 2002). This is because of its relatively slow blood flow as compared to cardiac out put (Gingerich, 1982) as well as the much closer association of hepatocytes to biliary system than is found in mammals (Hinton and Lauren, 1990).

Pesticide due to their potential toxicity produce biochemical changes in the tissues and organs of exposed animals, (Sastry and Sharma, 1979). The pesticides thus reaching the aquatic ecosystem get enriched in the aquatic food chain through bio-accumulation, bio-concentration and bio-magnification process (Murty, 1986). Energy for maintenance and activity comes from catabolism of food. In fish, protein is one of the main sources of energy which plays an important role in maintenance of blood glucose level.

Exposure to chemical pollutants elicits many molecular and biochemical changes in fish which preside cellular and

systemic dysfunction so that if appropriate parameters are monitored early warning signs of distress may be detected. To encounter stress metabolic excess involved in the interchange of organic constituents, that are responsible for production of energy, undergo change on carbohydrate and lipid constituents particularly such labile metabolites as glycogen. The present investigation is aimed to understand the alterations in glycogen levels at different time intervals in tissues like liver and intestine of freshwater fish, *Ophiocephalus punctatus* exposed to cypermethrin toxicity.

## MATERIALS AND METHODS

The fish were obtained from Wadali Lake in Amravati region. The fish having 12-30 cm length, 13-25g weight were selected for experiment

After the normal process of acclimatization and washing a group of six fishes were transferred to another aquarium containing sublethal concentration 0.0007  $\mu$ /L of cypermethrin for predetermined exposure at 24, 48, 72 and 96hr. The fishes were scarified and fresh tissue was isolated.

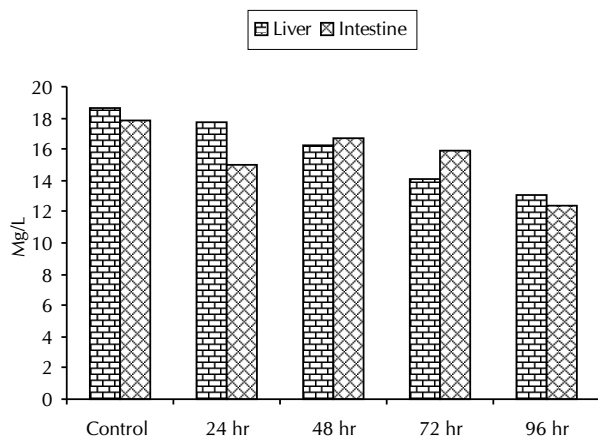
## Biochemical study

Dns (Di nitro salicylic acid) Sadasivam and Manickam (1992) method was adapted for estimation of glycogen in tissues of freshwater fish *Ophiocephalus punctatus* and measured in mg/L.

## RESULTS

The impact of sub lethal concentration of cypermethrin on

glycogen level in the liver and intestine tissues of *Ophiocephalus punctatus* observed at different time intervals Fig. 1.



**Figure 1: Effect of cypermethrin on glycogen of the fresh water fish *Ophiocephalus punctatus* at different time intervals (mg/L).**

There was observed a gradual decline in the glycogen level from the control value with an increase in the time period of treatment up to 96 hr. In intestine, there was fluctuation in glycogen value as compared to control value.

These decreased values of glycogen showed disturbed carbohydrate metabolism due to toxic stress.

## DISCUSSION

Biochemical alterations indicates functional impairment of the organs. As shown in result the glycogen level of fish showed decreased trend similar to be observed by Reddy *et al.*, (1986) in prawn. In *Laellidens marginalis*, exposed to malathion, decreased in the glycogen content reported by Ahemad *et al.*, (1978). Grant and Mehral (1973) observed that endrin inhibit the hydrolysis of glucose -6 phosphate by the inhibition of glucose 6- phosphatase. Mamata Kumari (2007) observed that there was fluctuation in glycogen level exposed to pesticide abate. Usually during toxic stress conditions there occurs a demand for excess energy, (Chandravathy and Reddy, 1994). It has been reported that catecholamine may deplete the glycogen reserve, as suggested by Pickering (1981). Several reports are available on the effect of muscular exercise on liver glycogen energy reserves in fish, which get depleted, (Black *et al.*, 1962; Nath and Kumar, 1987; Singh and Singh, 2002). Above study clearly indicate that the toxic nature of the cypermethrin affect the glycogen content of liver and intestine of fish *Ophiocephalus punctatus*.

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