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# Acute Effect of Malathion on Macromolecules in Muscle of *Channa Punctatus*

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**ABSTRACT:** Pesticides have an innate capacity to cause damage to biological system. Considering above fact the present study deals with the effect of the insecticide malathion on histological and biochemical study on muscle tissue in *Channa punctatus*. In present study effect of sub lethal concentration (0.8 ppm) of malathion on protein, lipid and glycogen content of fresh water fish *Channa punctatus* during 96 hours was studied. Total protein, lipid and glycogen showed decrement in muscle of *Channa punctatus*

**KEYWORDS:** Malathion, sub lethal, muscle, *Channa punctatus*.

## I. INTRODUCTION

For centuries pesticides have been used in agriculture to enhance food production by eradicating unwanted insects and controlling disease vectors. These pesticides ultimately reach the aquatic systems through different pathways affecting various aquatic organisms. Beside direct deposition or drift, these compound may reach aquatic habitats via run of, depending upon the precipitation, soil condition and slope of catchment area (Santhakumar *et al.* 1999). Among these pesticides, organophosphorous compounds are commonly used insecticides. Malathion is commonly used organophosphorous pesticide. While most of the malathion will stay in the areas where it is applied, some can move to areas away from where it was applied by rain, fog and wind. Once malathion is introduced into the environment, it may cause serious intimidation to aquatic organisms and is notorious to cause severe metabolic disturbances in non target species like fish and fresh water mussels (USEPA,2005).

*Channa punctatus* is common fresh water fish abundantly present in local river Godavari Dist. Nanded. It is one of the major source of food of poor population in local area. muscle is the major tissue component of fish and responsible for continuous supply of blood to whole body of fish. Scanty reports were available regarding biochemical and histological manifestation induced by pesticide on tissue of fish. Since, malathion is being extensively used in agriculture, there is scope to transfer to non-target organisms due to bioaccumulation and biomagnifications in existed environment. Hence the toxic impact of malathion on tissue of fresh water fish *Channa punctatus* was attempted.

## II. MATERIAL AND METHODS

For present study, commercial grade malathion (50% EC, manufactured by Coromandal fertilizer limited, Coromandal house, pesticide division, Ranipet, Vellore (TN), India) was procured from the local market. Healthy specimens of *Channa punctatus* were collected from local river Godavari Dist. Nanded. Their average length and wet weight ( $\pm$  SD) were recorded as  $23 \pm 2$  cm and  $80 \pm 4$  gms respectively. Fishes were treated with 0.1 %  $KmNo_4$  solution for 2 min. to avoid any dermal infection. The fish stock was then maintained in 100 liter glass aquaria for 14 days to acclimatize under laboratory condition. The fishes were fed with pieces of live earth worm on alternate days. A stock solution was prepared in acetone and mixed in water to obtain required dilutions. The  $LC_{50}$  value for 96 hours of malathion was determined by procedure of Finney (1971). The  $LC_{50}$  of malathion for 96 hours for *Channa punctatus* was 4 mg/liter. Fishes were exposed to sub lethal concentration (0.8 ppm) of malathion, simultaneously control group was also maintained.

For biochemical studies muscle of control and experimental groups of fishes were sacrificed after 24, 48, 72 and 96 hours. Total protein content was determined according to the method of Lowry *et al.*(1951). The total lipid content was estimated by the method of Blish and Dyer (1959). Glycogen content was estimated by Anthrone



method (Hedge and Hofrciter, 1962).

**Table-1** Levels of total protein, Lipid and Glycogen content in muscle tissue of *Channa punctatus* after exposure to sub lethal concentration of malathion.

Time in hours	Total protein	Total lipid	Glycogen
Control (00 hours)	140.50±1.01	94.50±1.34	20.15 + 1.12
24 hours	138.25±1.54*	89.21±1.33	16.99 + 1.52***
48 hours	122.50±1.18*	70.93±2.12***	14.27 + 1.03
72 hours	108.03±1.41	68.28±1.92***	10.15 + 0.17
96 hour	97.20±1.50*	50.93±1.49***	8.56 + 0.85*

[values are expressed as mg/gm wet wt of tissue. Values are mean ± SD of six replicates \* p<0.05, \*\* P<0.01, \*\*\* p>0.01, significant when student’s test was applied between control and experimental groups.]

### III. RESULT

In the present study it was observed that when the fresh water fish *Channa punctatus* exposed to sub lethal concentration of malathion showed decreased in the level of protein in muscle of treated group during 96 hours (97.20) compared with control (140.50) while total lipid content decreased (50.93) during 96 hours compared with control (94.50). Glycogen content in muscle also decreased (8.56) during 96 hours compared with control (20.15) (Table -1)

### IV.DISCUSSION

In present study, the fish *Channa punctatus* exposed to malathion showed significant alteration in biochemical parameters of tissue. The muscle tissue occupied significant position in physiology of fish. Since the muscles selected for the present study is some amount of pesticide might have focused its entry into the tissue through the circulatory system thus biochemical changes to cell system.

Scanty research work has been done on changes associated with muscle to sub lethal exposure of pesticide. In present investigation alterations in structure of muscle in fish *Channa punctatus* under sub-lethal treatment of malathion has been observed.

Protein is most characteristic organic compound found in the living cell while the protoplasm of the cell is composed of protein. They play vital role in the process of interaction of cellularmedium.

In experimentation, after 96 hours the decline in protein content was observed. This fall from the next onward day be attributed to the constantly increasing contact of the pesticide with the biosystem which ultimately resulted in protein breakdown. Kabeer (1979) showed increase in protein content in fish, *Tilapia mossambica* treated with methyl parathion andmalathion.

Even though most of the workers found that, there was reduction in protein contents in various tissues of the animal under different stress conditions. The decrease in protein content may be due to reduced protein synthesis and increased proteolysis. Joseph, (1987) observed the effect of copper on biochemical composition of *Cyprinus carpio* and found that total protein content of the brain, liver and muscle were declined.

Ramalingam and Ramalingam (1982) stated that proteins expected to involve in the compensatory mechanism of stressed organisms similar observation were made by Jagdeesen *et al.* (1999). Chandravathy and Reddy (1994) suggested that decline in the muscle protein content might be due to reduced protein synthesis, increased proteolysis and also due to utilization for metabolic process under lead toxicity. Rao *et al.* (1987) and Baskaren *et al.* (1989) reported reduction in protein content could be due to its utilization to mitigate the energy demand when the fish is under stress.

Decrease in protein content at sub lethal exposure of malthion to fresh water fish, *Channapunctatus* suggest the possible utilization of protein for various metabolic purposes and enhanced proteolysis to meet the high energy demand under pesticidal stress.

During present investigation a significant decrease in lipid content after exposure to malathion was observed in muscle of *Channa punctatus*. Reduction in level of lipid content suggests that organic reserves seem to have utilized





during four days. This situation provides important information regarding adaptive ability of *Channa punctatus* during pesticidal stress. They showed that reduction in lipid content might be due to utilization of lipid as a source of energy during stressful condition. Gupta (1987) has also reported that lipid content decreased in various tissues of *Channa punctatus* with increasing concentration of vegetable oil factory effluent Choudhary *et al.* (1981) studied the effect of malathion on the behavior and body composition of the *Heteropneustes fossilis* and found that the water and lipid contents of the whole body and ovary decreased as compared to control. Lomte and Sabiha Alam (1984) showed effect of malathion on the biochemical components of the proso branch, *Belamia bengalensis* and reported that the decrease in glycogen, protein and lipid under pesticidal stress. Decrease in tissue lipid and proteins might be partly due to their utilization in cell repair and tissue organization with the formation of lipoproteins, which are important cellular constituents of cell membranes, and cell organelles present in the cytoplasm (Harper, 1983). Nagabushanam *et al.* (1972) showed decline in lipid content in the hepatopancreas of the fresh water prawn *Macroranichium kristensis* in response to pesticide.

The decreased glycogen content in muscle is attributed due to inhibition of hormone and enzymes when the fish is under the influence of toxicant. During this time the conversion of carbohydrate into amino acid may be possible. Hence the decreasing trend in glycogen contents was noticed. Similar observations were made by (Gaiton *et al.* 1965; Stamp and Lesker, 1967; Edwards, 1973; Murthy, 1983; Anita Susan *et al.* 1999; Tilak 2002).

In conclusion it can be stated that sub lethal of malathion lead to alteration in decrease in biochemical content like protein, lipid and glycogen. Fish muscle showed significant decrease in macromolecules which disturb normal physiology of fish. This indicates that one should take necessary precaution in application of pesticide to protect life of fish.

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