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LIPID KINETICS IN RELATION TO THE TOXICITY OF MALATHION IN FRESH WATER FISH *CHANNA PUNCTATUS* (BLOCH)

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ABSTRACT
Muscle and liver lipid levels were studied in *Channa punctaus* exposed to 96 hours sublethal concentration of malathion (i.e. 0.8 ppm). Though slight increase in lipid level in muscle tissue during 24 hours, the decrease in lipid level of both tissues i.e. muscle and liver were observed during 96 hours in treated group compared with control.

KEYWORDS: *Channa punctatus*, malathion, sublethal.

INTRODUCTION

The use of pesticides has resulted in increased crop production and other benefits and has raised concerns about potential adverse effects on the environment and human health. Delibrate or accidental contamination of ponds by widely utilized organophophorous . Insecticides such as malathion is a potential problem for aquaculture in developing countries.The pesticides on reaching to the aquatic systems greatly influences the non-target organisms such as fish and birds (Fahmy, 2012). Among organophosphate pesticides malathion is considered relatively safe for the use in mammals. Malathion has been used in malaria eradication program in many countries. The reason for such wide spread use lies in its relatively low toxicity to mammals and high selectivity towards insect, paralleled by moderate persistence in the environment when compared with other organophosphorous (Wauchope, 1992).

Lipids are the most important source of energy in the absence of carbohydrates. Pesticides are known to induce severe impairment in lipid transport and metabolism which may lead to change in lipid composition of tissues. Mobilization of lipids following exposure of pollutant stress is quite expected. Young (1982) showed due to stress condition the carbohydrate storage got quickly exhausted and lipid served as the next biochemical entity. It broken down to meet the requirement of enhanced metabolism hence reduction in lipid occurs.

Accumulation of pesticides in fish depends upon lipid contents of its tissues. The affinity of different pesticides for fat is well illustrated by their high residues in fish oil, adipose, brain and liver tissues (Johnson, 1973). Many authors investigated accumulation of pesticides in different fat tissues of many fish species (Buhler *et al.*, 1969; Reinert, 1970; Verma *et al.* 1977). The available evidences suggested that pesticide residues were more accumulated in muscle and fat tissues of fish, it can reach the human body through food chain causing health hazards. Hence the present study was under taken to ilucidate the effect of pesticides of malathion on lipid content in vital tissues like muscle and liver of *Channa punctatus*.

MATERIALS AND METHODS

The fish *Channa punctaus* were collected from local river Godavari District 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.

The physico-chemical parameters of water analyzed by following standard method suggested by APHA(1998). 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 muscle, and liver were excised rapidly and processed for the biochemical estimation. Lipid estimation was done by chloroform methanol method suggested by Bligh and Dyer, 1959.

Table-1 Levels of Lipid content in different tissues of *Channa punctatus* exposed to sub-lethal concentration of malathion

Sr. No	Tissue	Control	Experimental			
			24 hrs	48 hrs	72hrs	96 hrs
1	**Muscle**	94.99±0.95	96.45±1.12*	89.28±0.69*	84.81±1.08*	82.28±0.83*
2	**Liver**	112.75±0.96	102.15±1.49*	94.85±0.82*	90.28±1.04*	86.56±1.12*

The values are expressed as mg/g 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

RESULTS AND DISCUSSION

The mean lipid level of muscle and liver showed significant decrease during 96 hours in treated group compared with control. Lipid content was relatively higher in liver than in muscle of *Channa punctatus*. During present investigation a significant decrease in lipid content after exposure to malathion was observed in muscle and liver 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. Amudha *et al.*, (1993) suggested that lipid content of fish reduced with increasing concentration of pollution. 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 efficient 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.

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). Gupta (1987) concluded vegetable oil factory effluent decreased lipid content in liver of *Channa punctatus* in vitro incorporation of radio labeled substance. Nagabushanam *et al.*, (1972) showed decline in lipid content in the hepatopancreas of the fresh water prawn *Macroranchium kristensis* in response to pesticide. Ram and Sathyansen (1987) reported reduction in total protein, lipid and elevation in cholesterol and alakaline phosphates content in liver of *Channa punctatus* exposed to mercurial fungicide.

Bano and Hasan (1989) have reported elevated level in lipid on lamellidens marginalis, a freshwater bivalve exposed to mercury in monsoon season. Patil and Kulkarni (1995) found the reduction in lipid content in fresh water fish *Channa punctatus* when exposed to pesticide summach. Tazeen *et al.*, (1996) observed decline in total lipid content when the cat fish *Mystus vittatus* exposed to pesticide nuvan. Tantarpale *et al.*, (2003) reported that decrease in total lipid content might be due to utilization of lipid during the toxic stress. Tazeen A.V.S. *et al.*, (1996) found the decline in total lipid content in different organs of cat fish *Mystus vitlatus* exposed to the pesticide nuvan. They mentioned the reduction of total lipids is possibly due to the excessive lypolysis and subsequently used for synthesis of glucose. All above discussion clearly indicated that malathion is toxic to fresh water fish *Channa punctatus.* The sublethal dose of organophosphorous pesticide malathion significantly altered Lipid levels in different tissues of *Channa punctatus.* It is concluded from present investigation that malathion even at sublethal concentration causes considerable changes in intermediary metabolism of fish, *Channa punctatus*. The cause for reduction in protein and lipid contents appears to be high energy demand which was fulfilled by lipolysis.

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