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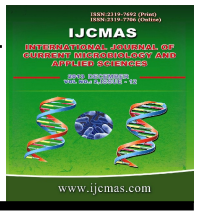

Original Research Article

The Toxic Effect of Pesticide Dimethoate 30% EC on the protein metabolism of the Fresh water fish, *Labeo rohita*

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A B S T R A C T

Significant differences were observed in protein metabolism of *Labeo rohita* exposed to concentration of 0.398 ppm for 24, 48 and 72 hours respectively. The toxic effect of the pesticide Dimethoate 30% EC were analysed in this study.The 10 healthy fishes were exposed to different concentration of pesticide to calculate the LC_{50} value. The LC_{50} value is 0.398 ppm.Four groups of fishes were exposed in 0.398 ppm concentration for 24,48 and 72 hours. Another group was maintained as control.At the end of each exposure period,fishes were sacrificed and tissues such as liver, gill, muscle and kidney were dissected and removed.Samples were tested for protein analysis.Decreased content of protein was observed when compared to control.

Keywords

Dimethoate; *Labeo rohita*; protein; liver..

Introduction

The rapid industrialization and green revolution introduced a large variety of chemicals into the environment. These chemicals create serious ecological problems particularly water pollution or aquatic pollution. Among these chemicals, pesticides are an integral part of present agricultural technology. Aquatic pollution by industrial effluent is considered as a serious problem to aquatic inhabitants. The chemicals present in the industrial effluent affect the normal life of animal (Baskaran *et al*., 1989).Agricultural inputs in terms of pesticides are increasing day by day and its residues are now being drained off into water bodies. The judicious use of pesticides in agricultural sector and its ultimate discharge into aquatic ecosystem have a potential toxicological concern to biota of the system including fishes (Tilak *et al*., 1980).

If the credits of pesticides include enhanced economic potential in terms of increased production of food and fibre, and amelioration of vector-borne diseases, then their debits have resulted in serious health implications to man and his environment. There is a evidence that some of these chemicals do pose a potential risk to humans and other life forms and unwanted side effects to the environment. No segment of the

population is completely protected against exposure to pesticides and the potentially serious health effects, though a disproportionate burden, is shouldered by the people of developing countries and by high risk groups in each country (WHO, 1990).

Materials and Methods

Dimethoate 30% EC is one of the organophosphorus insecticides widely used against vegetables and fruit sucking aphids, mites, saw flies and boring insects on cereals, cotton, chilly, tobacco and oil seeds. During rainy season along with running water,Dimethoate 30% EC insecticides enter the freshwater resources and results into aquatic pollution.Pesticides are well known example for causing more toxic effects in teleost.

Bulk of sample of fishes (*Labeo rohita*) ranging in weight from 4-5 gms and measuring 4-6 cm in length were procured from Tamil Nadu Fisheries Department, Aliyar, Tamilnadu. Fishes were acclimatized in the laboratory conditions for one month in large cement tank. The tank was washed using 1% KMnO4 to prevent fungal infection prior to stocking. The fishes were fed regularly with conventional diet rice bran and oil cake 1:1 ratio. Feeding was stopped one day prior to the start of the experiment. Fishes about the same size irrespective of sexes were selected for the experiment. The tap water free from contaminants was used as dilution water for the present study. The physico-chemical analyses of water used in the experiment were carried out using the method of (APHA, 2005).

Batches of 10 healthy fishes were exposed to different concentration of pesticide Dimethoate 30% EC to calculate the LC_{50} value by using the method of Finney, (1971). One more set of fishes are maintained as control in tap water. Appropriate narrow range of concentration was used to find the median lethal concentration using a minimum of 10 fishes for each concentration and the mortality was recorded for every 24 hours upto 72 hours. In 0.398 ppm out of 10 fishes 5 are died at 72 hours. Thus 0.398 ppm is selected as LC_{50}.

Four groups of fishes were exposed in 0.398 ppm concentration of the pesticide Dimethoate 30 % EC for 24, 48 and 72 hours respectively. Another group was maintained as control. At the end of each exposure period, fishes were sacrificed and tissues such as liver, gill, muscle and kidney were dissected and removed. The tissues (10mg) were homogenized in 80% methanol, centrifuged at 3500 rpm for 15 minutes and the clear supernatant was used for analysis of different parameters. Total protein concentration was estimated by the method of Lowry *et al*. (1951).

Results and Discussion

Liver tissues showed 1.70, 0.41 and 0.18 mg/g of protein in 0.398 ppm of Dimethoate 30% EC pesticide and 2.10 mg/g of protein in control after 24,48,72 hours exposures. Table 1 shows the decreased value of protein content in kidney as 0.98, 0.71 and 0.30 mg/g in 0.398 ppm of Dimethoate 30% EC and 1.47 mg/g in control after 24,48 and 72 hours exposures. In muscle tissues 1.12, 0.78 and 0.38 mg/g of protein in 0.398 ppm of Dimethoate 30% EC exposures and 1.89 mg/g in control after 24,48,72 hours respectively.

Table.1 Changes in protein content (mg/g) in the liver, Kidney, Muscle and gills of *Labeo rohita* exposed to pesticide Dimethoate 30% EC for different periods**.**

Tissues mg/g	Exposure concentration 0.398ppm	Exposure Periods		
		24 Hours	48 Hours	72 Hours
Liver	Control	2.10±0.07	2.10±0.07	2.10±0.07
	Experimental	1.70±0.06	0.18±0.03	0.18±0.04
	't' value	9.98**	49.75**	52.95**
	% change	19.04↓	80.47↓	91.42↓
Kidney	Control	1.47±0.03	1.47±0.03	1.47±0.03
	Experimental	0.98±0.01	0.71±0.04	0.30±0.04
	't' value	29.28**	32.58**	49.44**
	% change	33.33↓	51.70↓	79.59↓
Muscle	Control	1.89±0.03	1.89±0.03	1.89±0.03
	Experimental	1.12±0.04	0.78±0.04	0.38±0.21
	't' value	34.03**	53.28**	16.18**
	% change	40.74↓	59.25↓	79.89↓
Gills	Control	3.11±0.04	3.11±0.04	3.11±0.04
	Experimental	2.64±0.03	1.74±0.03	1.01±0.03
	't' value	20.15**	65.31**	93.54**
	% change	15.11↓	44.05↓	67.52↓

Results are mean (±SD) of 5 observations
% = percent increase/decrease over control. Parenthesis denotes the percentage.
C = Control E = Experiment

The protein level in gill is also reduced. In control the protein level is 3.11 mg/g. It is decreased to 2.64, 1.74, 1.01 mg/g in 0.398 ppm of Dimethoate 30% EC exposure for 24,48 and 72 hours respectively.

Environmental stress invokes compensatory metabolic activity in the organs of an animal through modification and modulation of the quantity and quality of problems. Gill is an important organ because of its direct contact with water, which allows the pesticides to enter through it and get accumulated in the fish body. The percentage decrease of protein is greater in gill. It is maximum in 72 hours. The percentage decrease is 67.52. Ganeshwade, (2011) reported that the alteration in protein value may also be related to some structural changes in the liver, the arrangement of hepatic words leading to the alteration of liver metabolism. The decrease in liver protein is also attributed to the inhibition of protein synthesis.

The decrease in protein content suggests an increase in proteolytic activity and possible utilization of its products for metabolic purpose. The fall in protein level during exposure may be due to increased catabolism and decreased anabolism of proteins (Ganeshwade,

2012). A significant reduction in the levels of proteins and glycogen (Sreekala *et al*., 2013).

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