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TOXICITY OF THE PESTICIDE DIMETHOATE 30% EC ON THE CARBOHYDRATE CONTENT OF THE FRESH WATER FISH, *CATLA CATLA*

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Abstract- The aim of this study was to evaluate the effect of pesticide Dimethoate 30% EC of the fresh water fish, *Catla catla* for 24, 48 and 72 hours respectively. The 10 healthy fishes were exposed to different concentration of pesticide to calculate the LC50 value. The LC50 value is 0.398 ppm. Compared with the control group, a significant decrease of carbohydrate was ascertained in the experimental group. The above results of examinations of the carbohydrate content indicate a marked neurotoxic effect of Dimethoate in fishes..

KEYWORDS: *Catla catla*, Toxicity, carbohydrate, Dimethoate, neurotoxic

I. INTRODUCTION-

The contamination of surface waters by pesticides used in agriculture is a problem of worldwide importance (I.R.Hill 1985).The aquatic ecosystem is contaminated by indiscriminate and wide spread of pesticide and other metallic pollutants in controlling the agricultural pests. The non-target organisms like fishes, bivalves, prawns and crabs etc. of the freshwater ecosystem are adversely affected. Fishes are very sensitive to a wide variety of toxicants in water. Various species of fish shows uptake and accumulation of many contaminants or toxicants such as pesticides.

Agrochemicals can indirectly affect fish by interfering with their food supply or altering the aquatic habitat, even when the concentrations are too low to affect the fish directly (R.D. Ewing 1999). Pesticides are mostly nonselective, widespread applied, possess toxic properties and in some cases are very refractory. These features entitle pesticides to be one of the most fearful group substances, as far as biological communities and humans are concerned. The present study has taken up to assess the effect of pesticide Dimethoate 30 % EC on the carbohydrate content of the fresh water fish, Catla catla.

II. .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 fresh water resources and results into aquatic pollution. Pesticides are well known example for causing more toxic effects in teleost.

Bulk of sample of fishes (Catla catla) ranging in weight from 4-5 gms and measuring 4-6 cm in length were procured from Dalsagar Lake Seoni, M.P. 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 analysis of water used in the experiment was 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 LC50 value by using the method of D.J. 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 up to 72 hours. In 0.398 ppm out of 10 fishes 5 are died at 72 hours. Thus 0.398 ppm is selected as LC50.

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. Quantitative estimation of carbohydrate in the tissues was done by the method described by Hedge and Hofreiter (1962).

III. RESULTS AND DISCUSSION

In control the carbohydrate level in liver is 17.40 mg/g. It is reduced to 11.83, 7.60, 6.42 mg/g in 0.398 ppm of Dimethoate 30% EC exposed for 24, 48 and 72 hours respectively. Kidney tissue showed 10.72, 6.40, 5.86 mg/g of carbohydrate in 0.398 ppm of Dimethoate 30% EC pesticide 8.40 mg/g of carbohydrate in control after 24, 48 and 72 hours exposures. In muscle tissue carbohydrate level for control is 46.60 mg/g and it is decreased to 44.80, 30.92 and 27.11 mg/g in 0.398 ppm of Dimethoate 30% EC exposures for 24,48 and 72 hours respectively. The carbohydrate levels in gills during control are 30.90 mg/g. It is reduced to 18.83, 15.62 and 11.68 mg/g in 0.398 ppm of Dimethoate 30% EC exposures for 24, 48 and 72 hours respectively.

Carbohydrates form an important organic constituent of animal tissues. It is one of the important macromolecule, which comes first to reduce fish from enduring stresses caused by any xenobiotic by providing energy. The results of the present finding showed a decrease of carbohydrate level in kidney and high in muscle. The percentage decrease of carbohydrate is greater in muscle. It is maximum in 72 hours. The percentage of decrease is 41.84.

A fall in glycogen level clearly indicates its rapid utilization to meet the enhanced energy demands in fish exposed to toxicants through glycolysis or hexose monophosphate pathway. It is assumed that decrease in glycogen content may be due to the inhibition of hormones which contribute to glycogen synthesis (R.M. Ganeshwade 2011). Ganeshwade (2012) reported the enhanced utilization of glycogen and its consequent depletion in tissues may be attributed to hypoxia since it increases carbohydrate consumption. A significant reduction in the levels of proteins and glycogen (Sreekala et. al 2013).Toxic stress imposes an increased energy requirement from the animal adopt to the changed metabolic condition and this achieved through utilization of reserve stores of carbohydrate in fish tissues under toxic stress is due to increased glycogenolysis.

Table-1: Changes in Carbohydrate content (mg/g) in the liver, Kidney, Muscle and gills of *Catla catla* exposed to pesticide Dimethoate 30% EC for different periods.

Tissues mg/g	Control Experimental	Exposure Periods		
		24Hours	48 Hours	72 Hours
Liver	**Control**	17.40±0.39	17.40±0.39	17.40±0.39
	Experimental	11.83±0.44	7.60±0.51	6.42±0.37
	't' value	21.14**	34.14**	45.63**
	% change	32.01↓	56.32↓	63.10↓
Kidney	**Control**	8.40±0.26	8.40±0.26	8.40±0.26
	Experimental	10.72±0.39	6.40±0.26	5.86±0.42
	't' value	10.96**	12.13**	11.67**
	% change	21.49↓	23.80↓	30.9↓
Mussels	**Control**	46.60±0.35	46.60±0.35	46.60±0.35
	Experimental	44.80±0.26	30.92±0.36	27.11±0.26
	't' value	9.283**	70.5**	100.6**
	% change	38.62↓	33.69↓	41.84↓
Gills	**Control**	30.90±0.39	30.90±0.39	30.90±0.39
	Experimental	18.83±0.30	15.62±0.35	11.68±0.51
	't' value	54.77**	65.6**	67.23**
	% change	39.15↓	49.51↓	62.45↓

Note: Results are mean (±SD) of 5 observations % = percent increase/decrease over control; C = Control E = Experiment

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