



Research Journal of Pharmaceutical, Biological and Chemical Sciences

Impact of an Insecticide 'Encounter' (Herbal Plant Extract) on Carbohydrate Content in the Freshwater Fish, *Labeo Rohita*

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ABSTRACT

Insecticides are used in agricultural practice to cope up with the problems created by the insects, pests which results in crop loss. The impact of insecticide on environment is grave. It enters water bodies through urban and industrial waste water discharge. Surface run off from non point sources. On reaching aquatic environment they cause serious concern to the aquatic life by changing their behaviour pattern. The insecticide Encounter (Herbal plant extract) is used for the present study. The fishes were exposed to different concentrations of insecticide 'Encounter' to calculate the LC₅₀ value. Thus LC₅₀ value is 0.11ppm. Four groups of fishes were exposed for 24, 48, 72 & 96 hours respectively. At the end of each exposure period, fishes were sacrificed and tissues such as liver, kidney, muscle and gills were removed and analyzed for carbohydrate content. It showed decreased value of carbohydrate content in all the tissues when compared to control.

Keywords: liver, kidney, insecticide, carbohydrate, *Labeo rohita*.

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INTRODUCTION

The extensive use of pesticides, insecticides, herbicides and fungicides are being promoted by Govt. of India to enhance the crop production to meet the demand of the growing population. The rotational behind this is the eradication of the undesirable insects, pests, weeds and herbs for increased yield, but on the other hand, these lead to large scale mortality of one of the most important aquatic fauna, the fishes forming stable food to the mankind.

Fish is an excellent experimental material to find out the effect of pesticides, herbicides and insecticides. Biochemical studies of fish tissues are of considerable interest for their specificity in relation to food of fish and for evaluating their physiological need at different periods of life. The energy demand during pesticide stress has been observed by Nanda *et al.*, [5]. Hence the present study showed the effect of insecticide ENCOUNTER (Herbal plant extract) on the carbohydrate content of the fresh water fish, *Labeo rohita*.

MATERIALS AND METHODS

The insecticide Encounter (Herbal plant extract) is used for the present study. It is dark brown in colour and liquid form. Encounter is a natural formulation derived from various herbals. It controls mites, scales, thrips and sucking pests effectively on all crops. Encounter is a mixture of herbal extract containing matrine, having excellent pest repellent property. It is primarily irritant to skin, eyes and respiratory tract and also affect the normal metabolism.

Bulk of sample fishes, *Labeo rohita* ranging in weight from 5-6 gms and measuring 5-7 cm in length were procured from Aliyar Dam. Fishes were acclimatized to laboratory conditions for 2 weeks in a large Syntax tank. The water was changed twice in a day. 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.

Batches of 10 healthy fishes were exposed to different concentrations of insecticide 'Encounter' to calculate the LC_{50} value by using the method of Finney [2]. One more set of fishes were 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 96 hours. In 0.11ppm out of 10 fishes 5 are died at 96 hours. Thus 0.11ppm is selected as LC_{50} .

Four groups of fishes were exposed in 0.11ppm concentration of the insecticide 'Encounter' for 24, 48, 72 & 96 hours respectively. Another group was maintained as control. At the end of the each exposure period, fishes were sacrificed and tissues such as gill, muscle, kidney and liver 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 carbohydrate estimation. Quantitative estimation of carbohydrate in the tissue was done by the method described by Hedge and Hofreiter [3].

RESULTS AND DISCUSSION

In control the carbohydrate level in the liver for 24, 48, 72 and 96 hours is 69.3 mg/g. It is reduced to 61.1, 53.6, 46.9 and 38.3 mg/g in 0.11 ppm of Encounter exposures for 24, 48, 72 and 96 hours respectively. The carbohydrate level in Kidney during control is 43.9 mg/g. It is reduced to 38.4, 36.8, 33.2 and 29.0 mg/g in 0.11 ppm of Encounter exposures for 24, 48, 72 and 96 hours. In muscle tissue the carbohydrate level for control is 53.1 mg/g and it is decreased to 41.2, 32.6, 29.8 and 19.6 mg/g in 0.11 ppm of Encounter exposure for 24, 48, 72 and 96 hours respectively. The carbohydrate level in gill during control is 24.6 mg/g. It is reduced to 19.6, 14.9, 11.2 and 9.8 mg/g in 0.11 ppm of Encounter exposures for 24, 48, 72 and 96 hours.

Table 1: Changes in Carbohydrate content (mg/g) in the Liver, Kidney, Muscle and Gills of *Labeo rohita* exposed to insecticide Encounter for different periods

Tissues mg/g		Exposure Periods			
		24 Hours	48 Hours	72 Hours	96 Hours
Liver	Control	69.3±0.06	69.3±0.06	69.3±0.06	69.3±0.06
	Experimental	61.1±0.07	53.6±0.53	46.9±0.59	38.3±0.44
	't' value	20.89	19.56	84.79	63.48
	% change	11.83↓	22.65↓	32.32↓	44.73↓
Kidney	Control	43.9±0.40	43.9±0.40	43.9±0.40	43.9±0.40
	Experimental	38.4±0.45	36.8±0.57	33.2±0.46	29.0±0.48
	't' value	20.08	22.45	38.81	52.67
	% change	12.52↓	16.17↓	24.37↓	33.94↓
Muscle	Control	53.1±0.71	53.1±0.71	53.1±0.71	53.1±0.71
	Experimental	41.2±0.36	32.6±0.47	29.8±0.56	19.6±0.36
	't' value	33.00	53.28	52.18	92.91
	% change	22.41↓	38.6↓	43.87↓	63.08↓
Gill	Control	24.6±0.57	24.6±0.57	24.6±0.57	24.6±0.57
	Experimental	19.6±0.27	14.9±0.48	11.2±0.22	9.8±0.46
	't' value	17.46	28.72	48.29	44.62
	% change	20.32↓	0.48↓	54.47↓	60.16↓

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

Carbohydrates 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 significant decrease in carbohydrate content in all the tissues studied. The decrease in carbohydrate indicated the altered carbohydrate metabolism which might have resulted from the enhanced breakdown through glycogenolysis to meet the high energy demand, due to stress.

Shanthi *et al.* [6] noticed the decrease of carbohydrate in all tissues envisage the rapid utilization of carbohydrates for excess energy needed to alleviate the toxic stress. Clara bindu and Sivakumar, [1] reported that decrease of glycogen content in liver and muscle of *sarotheroidon mossambicus* due to increased glycogenolysis to meet the excess energy



demands imposed as the severe anaerobic stress of Nuvan and Sumicidin in toxication. Reduction in carbohydrate content in all the tissue may be due to the rapid depletion of stored glycogen to provide energy for fish under stress [4].

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