



Original Research Article

Changes in Protein content of the Freshwater fish, *Labeo rohita* due to the effect of an insecticide 'Encounter' (Herbal Plant Extract)

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A B S T R A C T

Keywords

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Toxicology is the measurable study of the deleterious effects due to chemical or physical agents, which cause adverse effects of chemical on living organisms. The insecticide Encounter (Herbal plant extract) is used for the present study. It is a natural formulation derived from various herbals. The fishes were exposed to different concentrations of insecticide 'Encounter' to calculate the LC₅₀ value. The LC₅₀ value is 0.11 ppm. 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 analysed for Protein content. It showed decreased value of Protein content in all the tissues when compared to control.

Introduction

Mode of action of different chemicals leading to varied effect on many body tissues. Some toxins exert their effect locally at the portal of entry, resulting in damage to external surface of the body. The susceptibility of animal tissues to different chemical agents may vary from animal to animal and also within the same animal among different tissues and incorporation even at the very low concentrations of the parent and or their metabolites cause effect in the vital tissues of fishes to cause serious morphological alterations.

Many insecticides have shown to effect the growth and reproduction in fishes with evidence of tissue damage (Verma and

Raji, 2006). The severity of damage depends on the toxic potentiality of a particular compound or insecticide accumulated in the tissues. Hence the present study showed the effect of insecticide ENCOUNTER (Herbal plant extract) on the protein 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 LC₅₀ value by using the method of Finney(1971). 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 up to 96 hours. In 0.11ppm out of 10 fishes 5 are died at 96 hours. Thus 0.11ppm is selected as LC₅₀.

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 protein estimation. Total protein concentration was estimated by the method of Lowry *et al.*, (1951).

Results and Discussion

Liver tissues showed 2.89,2.01,1.07 and 1.03 mg/g of protein in 0.11 ppm of insecticide Encounter and 3.51 mg/g of protein in control after 24,48,72 and 96 hours exposure. Decreased value of protein content in kidney as 5.46,3.78,2.35 and 2.07 mg/g in 0.11 ppm of Encounter and 6.10 mg/g in control after 24,48,72 and 96 hours exposure. In muscle tissues 2.12,1.61,1.30 and 0.69 mg/g of protein in 0.11 ppm of Encounter exposure and 2.89 mg/g in control after 24,48,72 and 96 hours respectively. The protein level in gill is also reduced. In control the protein level is 1.94 mg/g. It is decreased to 1.03,1.0,0.98 and 0.51 mg/g in 0.11 ppm of Encounter exposure for 24,48,72 and 96 hours respectively.

The result of the present study showed significant decrease in protein content in the tissues studied. The percentage decrease of protein is greater in muscle. It is maximum in 96 hours. The percentage of decrease is 76.12. Fall in tissue protein content might be attributed to diversification of energy demands when the fish under stress or altered enzyme activities (Jadhav and Lomate, 1982).

A number of workers have reported decline in protein level of various organs and tissues under toxic stress of various chemical. Chezhian *et al.* (2010) observed the depletion of protein fraction in the tissues may be due to their degradation and possible utilization for metabolic purpose. Fall in tissue protein content

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

Tissues mg/g	Parameters	Exposure Periods			
		24 Hours	48 Hours	72 Hours	96 Hours
Liver	Control	3.51±0.083	3.51±0.083	3.51±0.083	3.51±0.083
	Experimental	2.89±0.067	2.01±0.038	1.67±0.053	1.03±0.047
	't' value	12.89	36.38	41.24	57.50
	% change	17.66↓	42.73↓	52.42↓	70.65↓
Kidney	Control	6.10±0.054	6.10±0.054	6.10±0.054	6.10±0.054
	Experimental	5.46±0.63	3.78±0.06	2.35±0.06	2.07±0.04
	't' value	16.80	58.55	97.14	127.43
	% change	10.49↓	38.03↓	61.47↓	66.06↓
Muscle	Control	2.89±0.052	2.89±0.052	2.89±0.052	2.89±0.052
	Experimental	2.12±0.06	1.61±0.088	1.30±0.077	0.69±0.063
	't' value	21.11	27.79	37.90	59.51
	% change	26.64↓	44.29↓	55.01↓	76.12↓
Gill	Control	1.94±0.033	1.94±0.033	1.94±0.033	1.94±0.033
	Experimental	1.03±0.058	1±0.058	0.98±0.068	0.51±0.056
	't' value	37.15	30.99	27.95	48.76
	% change	46.9↓	48.45↓	49.48↓	73.71↓

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

might be attributed to the diversification of energy to meet the impending energy demands when the fish is under stress or altered enzyme activities (Saradhamani and Binukumari, 2011). The altered mobility and low content of proteins reflects a change in the rate of synthesis and degradation of protein (Nagaraju and Venkata Rathnamma, 2013).

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