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CHANGES IN CHOLESTEROL CONTENT OF THE FRESHWATER FISH, *LABEO ROHITA* DUE TO THE EFFECT OF AN INSECTICIDE 'ENCOUNTER' (HERBAL PLANT EXTRACT)

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ABSTRACT: Recent evidence indicates that fish, an extremely valuable resource, are quickly becoming scarce. One consequence of this scarcity is the increasing concern for fish survival and a growing interest in identifying the levels of various chemical pollutants, which are safe for fish and other aquatic life. Pesticides are among the most hazardous chemicals to men and ambient. Insecticides are extensively used to protect agricultural crops against the damages caused by pests. However, these chemicals may reach other ecological compartments as lakes and rivers through rains and wind affecting many other organisms away from the primary target. Biochemical and physiological variables show specific responses to certain type of environmental stress. 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 LC_{50} value. The LC_{50} 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 analysed for Cholesterol content. It showed decreased value of Cholesterol content in all the tissues when compared to control.

INTRODUCTION: Water contains a balanced amount of nutrients and normal fluctuations in salinity and temperature. The fresh water is harvested for drinking purposes in all the areas and also it is used for agricultural and fisheries. The onset of industrialization has resulted in the application of chemicals for human welfare. This has led to the introduction of various chemicals for controlling different agricultural and house hold pests.

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The aquatic systems are more stable and relatively homogenous in comparison to the terrestrial ecosystem. This is because the peculiar physical and chemical characteristics of water. Any disturbance to this natural ecological balance brings about a rapid deterioration of such an ecosystem.

Toxicity tests are necessary to predict the safe contaminant into the environment. In aquatic toxicology the traditional LC_{50} tests is often used to measure the potential risk of a chemical [1].

Pesticides and related chemicals destroy the delicate balance between species that characterizes a functioning ecosystem [2]. Pesticides are not highly selective but are generally toxic to many macrophytes, non-target organisms such as fish [3-4].

Hence, the present study showed the effect of insecticide ENCOUNTER (Herbal plant extract) on the Cholesterol 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. 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 cholesterol estimation. Cholesterol was estimated based on enzymatic method using cholesterol esterase, cholesterol oxidase and peroxide[5].

RESULTS AND DISCUSSION: The cholesterol content in the liver tissue exposed to insecticide Encounter were 89.7, 66.5, 61.5, 49.0 and 101.3 mg/g in control after 24, 48,72 and 96 hours exposures. Kidney recorded 54.8, 49.0, 45.0 and 30.6 mg/g when exposed to 0.11 ppm of Encounter and in control it is recorded as 63.8 mg/g for 24, 48, 72 and 96 hours exposures.

Muscle tissue was found to contain 50.0, 44.8, 30.9 and 25.7 mg/g in 0.11 ppm of Encounter and 51.6 mg/g of cholesterol in control for 24, 48, 72 and 96 hours exposure periods. The amount of cholesterol in gill was 27.1, 19.0, 16.8 and 10.0 mg/g in 0.11 ppm of Encounter in exposure periods. In control it was found to be 33.2 mg/g in 24, 48, 72 and 96 hours respectively (**Table 1**).

Cholesterol is an important normal body constituent used in the structure of cell membranes, synthesis of bile acid and synthesis of steroid hormone. Thus any change in lipid metabolism affect the ability of fish to store energy that obtains nutrients and in long term their stability to survive. The effects of sublethal concentration of cadmium the oxidative stress and biochemical parameters of the fish, *Catla catla* [6]. Decrease in lipid contents in the tissues indicates that lipid hydrolysis might be accelerated to derive energy to overcome pesticide[7]. The exposure to various toxicants considered stressful such as heavy metals, pulp mill effluents and pesticides causes reduction in the cholesterol of the fish [8]. This may be due to possibility of active cholestrololysis.

CONCLUSION: Cholesterol contents were found to be decreased significantly in all tissue. This may be due to utilization of fatty deposits instead of glucose for energy purpose. Cholesterol level is maximum in liver and minimum in gill.

From the present study, it is concluded that the above biochemical parameter could be used as one of the non-specific biomarkers with regard to the effects of toxicants on organisms. It is also suggested that the random use of fertilizers and pesticides must be avoided for preserving our aquatic resources.

TABLE 1: CHANGES IN CHOLESTEROL 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	101.3±0.31	101.3±0.31	101.3±0.31	101.3±0.31
	Experimental	89.7±0.38	66.6±0.36	61.5±0.35	49.0±0.46
	't' value	52.40	160.52	187.61	208.36
	% change	11.45↓	34.35↓	39.28↓	51.62↓
Kidney	Control	63.8±0.41	63.8±0.41	63.8±0.41	63.8±0.41
	Experimental	54.8±0.43	49±1.27	45±0.36	30.6±0.37
	't' value	33.77	24.70	76.11	133.90
	% change	14.106↓	23.19↓	29.46↓	52.03↓
Muscle	Control	51.6±0.52	51.6±0.52	51.6±0.52	51.6±0.52
	Experimental	50±0.43	44.8±0.36	30.9±0.33	25.7±6.56
	't' value	5.275	23.74	74.11	75.397
	% change	3.1↓	13.178↓	40.11↓	50.19↓
Gill	Control	33.2±0.23	33.2±0.23	33.2±0.23	33.2±0.23
	Experimental	27.1±0.49	19.0±0.43	16.8±0.56	10±0.60
	't' value	25.30	65.09	60.56	80.27
	% change	18.37↓	42.77↓	49.39↓	69.87↓

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

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