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Impact of Dimercon on Biochemical Indices in Ovaries of Freshwater Fishes, *Labeo rohita and Ctenopharyngodon idella*

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ABSTRACT

The total protein and total amino acid content of ovaries were studied in the freshwater fish; *L.rohita and C.idella* exposure to various sublethal concentrations of Dimecron (0.0064%, 0.0128%, 0.0192 and 0.0075%, 0.015%, 0.0225%) respectively for different time periods up to 96 hrs. All the concentrations of Dimecron brought about a significantly decrease in total protein and total amino acid content. The results are discussed in relation to the concentration of the most commonly used pesticide in this region.

INTRODUCTION

Aquatic Toxicology is the study of the effects of environmental pollutants on aquatic organisms, such as pesticides especially the insecticides, on the health of fish or other aquatic organisms. Pesticides are substances used to control pests, including insects, aquatic weeds, plant diseases, and Aquatic snails that carry the cause of schistosomiasis. Pesticides have been found to be highly toxic not only to fish but also to the other organisms, which constitute the food chain. Pesticides in general, are used very extensively in agriculture, forestry, public health and in veterinary practices (Buck,1993; David et al. 2009; Banaee,2013).

Pesticides accumulated in tissues leads to many physiological and biochemical changes thereby influencing the activities of several enzymes and metabolites and finally causes the entire metabolic process disturbed (Austin,1998; Relyea and Hoverman, 2008).

The natural physiological functioning of an organism gets disturbed on exposure to toxicant stress. It induces its effect first at cellular or even at molecular level, but ultimately causes physiological, pathological and biochemical alterations. It is, therefore necessary to focus attention on changes in biochemical composition of organisms, which are constantly under pollutant threat. When the pesticides

come in contact with internal organs, irreversible changes in metabolic activities take place that eventually cause biochemical changes (Pazhanisamy and Indra, 2007). Pesticide pollutants act as stress inducing agents which affect the functional state of tissues of the exposed organisms, all pollutants are not toxic but all pesticides are toxicants. Many pesticides have been reported to produce a number of biochemical changes in fish both at lethal and more often at sublethal levels. Changes in ion concentrations, organic constituents, enzyme activity, endocrinal activity and chemoregulators in fish have been attributed to pesticides. Since aquatic environment is the ultimate sink for all pollutants, aquatic toxicity testing has became an integral (Wasim et al.2009).

It is well known that extensive usage of organophosphorus (OP) compounds in agriculture has resulted in a widespread distribution in the environment. The OP pesticides (OPs) have largely replaced organochlorine (OCl) compounds in the agricultural activities. OPs have been widely used to control agricultural pests, but these are harmful to non-target aquatic organisms when frequently used, due to contamination of aquatic environment through run-off (Joseph and Raj, 2011). The Pesticides are extensively used in agricultural management for agricultural food production but through their excessive. The indiscriminate use in agricultural pest management and public health operations to eradicate disease vectors are being translocated into aquatic ecosystem and frequent exposure to these pesticides. Now a days an organophosphate pesticide is widely used in controlling agricultural pests and as such likely to make their way through runoff from agricultural lands drift from aerial and land applications to near by water bodies. These pesticides pose a critical stress on the non-target aquatic biota like Fishes; Crustaceans; Molluscans and other aquatic animals, which are economically important as a food. Numbers of workers have concentrated on the vital aspect of toxicity of residual pesticides on physiology of a number of aquatic animals Kleerkoper (1974), Shiva Prasad Rao et al., (1981) have study the effect of methyl parathion on tissue proteins and excretory products of the snail, *Pila globosa.*

The organophosphate is highly toxic and extensively used. A little information is known about the effects pesticides on the tissue physiology of fishes and other aquatic animals. The present study was undertaken to study the effect of on total protein and total free amino acids contents in ovaries of freshwater fishes, *L.rohita* and *C.idella.*

MATERIALS AND METHODS

The freshwater fishes L.rohita and *C.idella* were collected from and were acclimated to the laboratory condition for about 15 days and were feed with planktonic materials and other food during the period of acclimation, water was replaced daily after feeding. The fishes were starved for 24 hr before exposure to avoid nutritional effects. LC50 was determined before under taking the present investigations. The fishes, *L.rohita* and *C.idella* of approximately same size and weight (12.0±1.2g). The fishes were treated with three sublethal concentrations such as $1/2^{th}$, $1/4^{th}$ and $1/6^{th}$ concentrations of LC_{50} After each exposure periods total protein and total free amino acids content in the ovaries were estimated by employing the method of Probit (Finney, 1971). The data statistically analyses by performing student 't' test.

RESULTS AND DISCUSSION

The total proteins and total free aminoacids contents in ovaries of freshwater fishes, *L.rohita* and *C.idella* were found to decrease in all sub lethal concentration of and different time period of exposure have been presented in Table 1 to 4.

Table 1: Effects of Sub lethal concentration of Dimecron on total protein content (mg/g wet weight of tissue) in ovaries of freshwater fish, *L. rohita.*

Days	Control	Sublethal Concentrations Dimecron		
		0.0064	0.0128	0.0192
1	49.53±3.29	47.33±1.18	43.07±1.55	36.33±2.17
3	44.07±0.89	41.33±1.18	37.13±2.62	33.63±1.40
7	43.0. ±1.54	37.13±2.13	35.13±2.38	32.10±1.72
15	42.40±1.72	35.07±2.33	27.67±1.83	20.60±1.33

Mean values are ±SD of 6 individual observations. All Values are significant at $P < 0.05$

Table-2: Effects of Sublethal concentration of on total amino acids content (mg/100 mL) in ovaries of freshwater fish; *L.rohita*.

		Sublethal Concentrations of Dimecron

Days	Control	0.0064	0.0128	0.0192
1	8.62±0.22	8.12±0.22	7.89±1.55	7.45±
3	8.62±0.21	7.89±0.77	7.28±0.27	6.1±0.06
7	8.48 ±0.65	7.4±0.64	6.9±0.34	5.4±0.28
15	8.48±0.65	7.35±0.35	6.00±0.26	4.88±0.24

Mean values are ±SD of 6 individual observations. All Values are significant at $P < 0.05$

Table 3: Effects of Sublethal concentration of Dimecron on total protein content (mg/g wet weight of tissue) in ovaries of freshwater fish, *C.idella* is the average of 6 observation ±S.D.

Days	Control	Sublethal Concentrations of Dimecron		
		0.0064	0.0128	0.0192
1	44.67±1.69	41.40±1.57	37.87±2.42	36.27±2.31
3	44.27±1.42	39.73±2.02	35.87±1.31	34.37±1.51
7	43.03 ±1.54	37.13±2.13	35.13±2.38	32.10±1.72
15	42.40±1.72	32.13±1.85	26.80±4.40	21.40±1.34

Mean values are ±SD of 6 individual observations. All Values are significant at $P < 0.05$.

Table-4: Effects of Sublethal concentration of Dimecron on total free amino acids content (mg/100 mL) in ovaries of freshwater fish, *C.idella* is the average of 6 observation ±S.D.

Days	Control	Sublethal Concentrations of Dimecron		
		0.0064	0.0128	0.0192
1	8.12±1.12	7.89±0.77	6.57±0.36	5.72±0.25
3	8.12±1.12	6.59±0.56	5.52±0.57	4.85

7	8.48 ±0.65	6.57±0.36	5.22±0.39	4.85±0.57
15	8.48±0.65	5.45±0.50	4.88±0.24	4.07±0.15

The significant decrease in protein content would suggest that pollutant impair the process of protein synthesis in the tissues of fishes exposed to pesticides.

In the present study, the level of protein was recorded to be decreased in all organs after the treatment with pesticide when compared to the control. Decrease in protein might be due to inhibition of protein synthesis or increase in the rate of diminution of amino acids (Ganeshwade, 2011; Binukumari and Vasanthi, 2013) which may be entered into tricarboxylic acid (TCA) cycle through aminotransferases probably to cope up with high energy demands in order to meet the stress condition. The fall in protein level during exposure might be due to increased catabolism and decreased anabolism of proteins. Similar kinds of observations were reported for various toxic stresses (James et al. 1979; Natarajan, 1981).

The decrease in the total protein and the total free amino acid content in ovaries of freshwater fishes, *L.rohita* and *C.idella* were suggested the possible utilization of these compounds for metabolic purpose. The decrease in the total protein suggest the enhancement of proteolysis; which may in agreement with the higher level of digestive enzymes activity, while the decrease the total free amino acids might suggest the occurrences of transamination activity to meet the energy demands under Pesticide stress condition. The decrease total free amino acids contents in ovaries may be due to in ability of the tissue to accumulates the amino acids or utilization of amino acids for the production of energy resulting information of nitrogenous waste products earlier studies showed the decrease in the total protein and total free amino acids contents when snail; Pila globosa exposed to methyl parathion. Shiva Prasad Rao et al., (1981); Kamble et al., (1984) showed and increase in total free amino acids contents in hepatopancreas, muscles and gills of freshwater crab, *Barytelphusa guerini* when exposed to sublethal concentration of Hilden an organochlorine pesticide. Kamble et al., (2002) also showed that decrease in the total

protein as well as free amino acids content in ovaries when the fishes, *L.rohita* and *C.idella* exposed to varying sublethal concentration of pesticide durations between 1 to 15 days.

Finally, we can conclude that the "***Protection of wildlife and Water Quality"*** is possible when rationalize the use of pesticides. Also, when Pesticides must choosing judiciously and are used in combination with other pest management tools, and applied safely, the surface water pollution and contamination of our aquatic life could be avoided.

The variations in biochemical parameters including protein content serves as a tool to monitor the pathological status of the treated fish. Histological alterations also could be used as meaningful indicators of pesticide pollution. It is well known that the accumulation of pesticides in the water body primarily affects the non-target organism especially fish and get deposited. These fish through food chain affects humans and causes deleterious effects. Hence, the usage of the pesticide should be restricted to have a healthy ecology.

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