

## Effect of Dimethoate on the level of cholesterol in freshwater *Puntius ticto* (Ham)

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### ABSTRACT

*Puntius ticto*, fresh water fish exposed to lethal and two sub lethal concentrations of Dimethoate (5.012 & 2506, 1.253ppm.) for 96 hrs and 60 days respectively. Cholesterol content was observed from different tissues after exposure period. Acute exposure results showed that Cholesterol level was increased in kidney and decreased in ovary, testis, intestine, muscles, gills, brain and liver. A chronic result shows decreased Cholesterol content in ovary, testis, intestine, muscles, gills, kidney and brain. Cholesterol content was decreased during exposure period; it might be possible that Dimethoate causes general damage, blockage of enzyme system for Steroidogenesis in ovary and the capacity of liver to store Cholesterol due general damage.

**Key words:** Acute toxicity, chronic toxicity, Cholesterol, Dimethoate, *Puntius ticto*.

### INTRODUCTION

Pesticides are an integral part of present day agricultural technology. They are greatly contributing towards increasing world food supply by protecting the crop yield. Due to intensive development of agriculture in recent years and rapid growth of industrialization in our country, there has been a great increase in manufacture and utilization of fertilizers, pesticides, petrochemical products, detergent and other synthetic chemicals and agricultural wastes pose a serious threat to the water ecosystem and aquatic life (Burton and Sinsheimer, 1963). Fishes are very sensitive to a wide variety of toxicants in water, various species of fish show uptake and accumulation of many contaminants or toxicants such as pesticides (Herger *et al*, 1995) Due to accumulation of pesticides in tissues produces many physiological and biochemical changes in the fishes and freshwater fauna by influencing the activities of several enzymes and metabolites (Nagarathnamma and Ramamurthi, 1982).

The alteration in biochemical contents in different tissues of fish due to toxic effects of different heavy metals and pesticides have been reported by number of workers Verma *et al*, (1983); Gupta *et al*, (1987); Khan *et al*, (1992); James & Sampath (1995); Das *et al*, (1999); Khare and Singh (2002); Desai *et al*, (2002); Remia *et al*, (2008); Hadi *et al*, (2009) and Ganeshwade, (2011)

Extensive work has been done on the toxic effects of pesticides on protein, carbohydrate, lipid content of fish, but very little work have been

done on Cholesterol content. Therefore the present work has been an attempt to assess the alteration in Cholesterol content in *Puntius ticto* under Dimethoate toxicity stress.

### MATERIALS AND METHODS

The freshwater fish *Puntius ticto* were collected from the water sources around Aurangabad city (M.S., India), were acclimatized in aged, dechlorinated and well aerated water for two weeks. During acclimatization they were fed on alternate days with pieces of live earthworms. The LC<sub>50</sub> values are determined by following the guidelines given by Finney (1971) and Annon (1975). The acclimated fish were exposed to lethal concentration (5.012 ppm) for 96 hrs. and two sub lethal concentrations (2.506 and 1.253 ppm) for 60 days. Simultaneously a control group of healthy fishes were maintained under identical conditions. The fishes were sacrificed immediately after exposure period and different tissues were processed for the biochemical estimations. Cholesterol content was estimated by Kolmer *et al*, (1969). Results of the experiment have been represented in the table no.1 and graphically in fig 1.

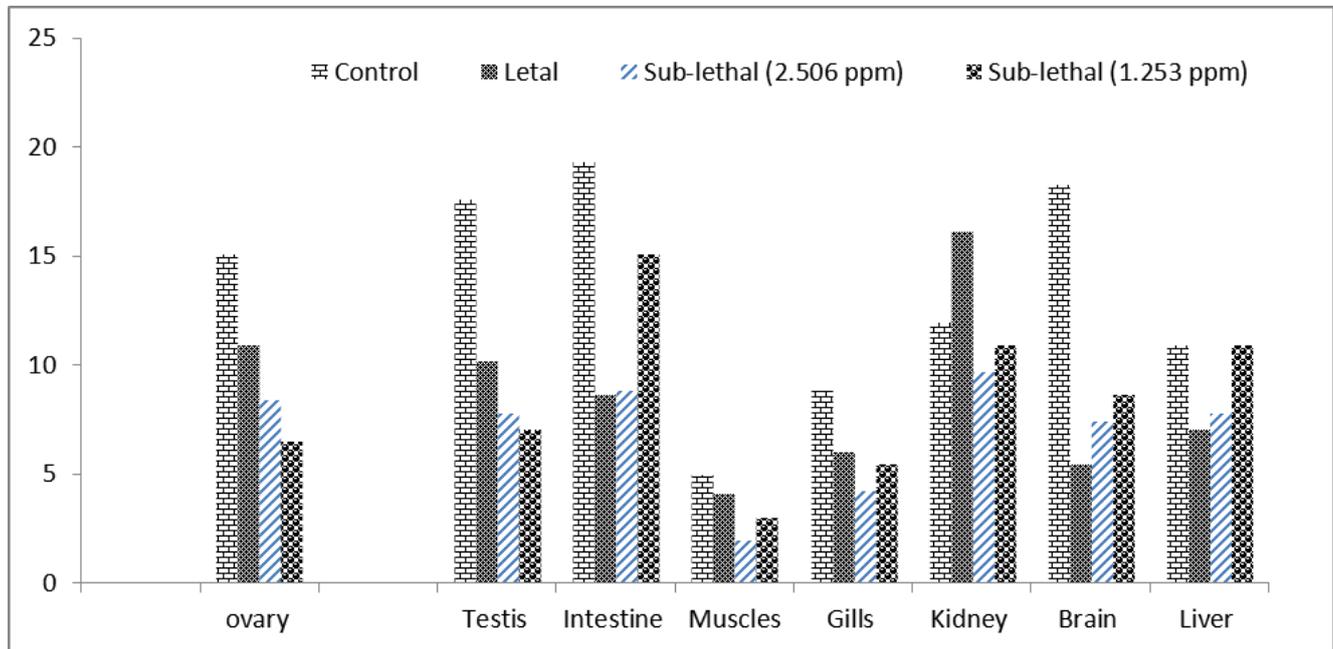
### RESULTS AND DISCUSSION

Cholesterol content in kidney was increased during acute exposure where as decreased Cholesterol content were observed in ovary, testis, intestine, gills, brain and liver.

Chronic exposure results showed that Cholesterol content decreased in ovary, testis, intestine, muscles, gills, kidney and brain to both sub lethal concentrations, where as in the liver decreased level of Cholesterol is observed at 2.506 ppm and increased level was observed in 1.253 ppm exposure.

The chronic results when compared, it shows that decreased level of Cholesterol observed in intestine, muscles, gills, kidney, brain and liver; whereas in certain tissues i.e. ovary and testis showed increased level at 2.506 ppm exposure.

**Fig. 1: Fluctuations in Cholesterol content in *Puntius ticto* to dimethoate toxicity exposure**



**Table1: Fluctuations in Cholesterol content in *Puntius ticto* to dimethoate toxicity exposure.**

Sr. No.	Tissues	Control	Letal (5.012 pm)	% change	Sub-lethal (2.506 ppm)	% change	Sub-lethal (1.253 ppm)	% change
1	ovary	15.0856 1.0476	10.8952** 1.0476	-27.78	8.3809** 1.3095	-44.44	6.4952*** 0.5238	-56.94
2	Testis	17.5476 1.3095	10.1269** 0.7561	-42.29	7.7523*** 1.0476	-55.82	7.0190*** 0.5238	-60.00
3	Intestine	19.2761 1.0476	8.5904*** 0.5238	-55.43	8.7999*** 0.2619	-54.34	15.0856** 1.0476	-21.73
4	Muscles	4.9238 0.5238	4.0507 0.3025	-17.73	1.9381* 1.0476	-60.63	2.9854** 0.2623	-39.36
5	Gills	8.7999 1.0476	5.9714* 0.5238	-32.14	4.2253** 0.3025	-51.98	5.4474** 0.5236	-38.09
6	Kidney	11.9426 1.0474	16.1333 1.0476	35.09	9.6904 1.3095	-18.85	10.8952 1.0476	-8.77
7	Brain	18.2284 1.0475	5.4476*** 0.5238	-70.11	7.4031*** 0.6048	-59.38	8.5904*** 0.5238	-52.87
8	Liver	10.8952 1.0476	7.0190** 0.5238	-35.57	7.7523* 1.0476	-28.84	10.8952 1.0476	00

The values are expressed in mg/100 mg dry weight (mean S.D.)

\* = P < 0.05; \*\* = P < 0.01; \*\*\* = P < 0.001.

Cholesterol level was decreased in all the tissues except the kidney was observed. Dimethoate toxicity causes damage and blockage of enzyme system for steroidogenesis in ovary and also causes damage in liver. Due to this damage cholesterol level decreases. Similar results were observed by Yoganobano and Hasan (1989). Khan *et al*, (1992) observed effect of Cadmium on biochemical contents in liver and ovary of *Garra mullya* and found that significant decrease in Cholesterol and stated that this may be due to general damage. Shakoori *et al*, (1996) studied effect of sublethal doses of fenvalerate on the blood, liver and muscles of fish *Ctenopharyngodon idella* and observed decreased level of Cholesterol. Virk and Sharma (1999) studied biochemical changes induced by nickel and chromium in the liver of *Cyprinus carpio* and observed significant decline in the cholesterol content of liver. This may be due to dimethoate

toxicity stress which suppresses the activity of a number of enzymes responsible for lipid transformation ultimately causing disturbance in lipid metabolism and leads decrease value of cholesterol. Similar results were observed by Choudhary and Gaur (2001), Shindhe *et al*, (2002). In kidney Cholesterol level increases, this may be due to liver disfunction and Cholesterol is accumulated or shifting towards kidney. Similar results were observed by Desai *et al*, (2002) Remai *et. al.*, (2008) and Ganeshwade (2011).

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