TOXIC IMPACT OF DIMETHOATE ON THE BIOCHEMICAL COMPOSITION OF VITAL TISSUES OF FISH ARIAS DUSSUMIERI

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The aquatic ecosystem is contaminated by indiscriminate and wide spread of pesticides and other metallic pollutants in controlling the agriculture pests. The many non-target organisms like fishes, bivalves, prawns and crabs etc of the freshwater ecosystem are adversely affected.

Biochemical studies are good parameters which help to see the effect of pesticide on biochemical composition of vital tissue of fish. Hence attempt has been made to find out biochemical changes in tissues like muscle, liver, gills and kidney of fish.

MATERIALS AND METHODS-The fish were collected from Manjara River, Latur district and brought to laboratory. These fishes were observed for any pathological symptoms and then placed in 0.1% potassium permagnate ($KMnO_4$) for two minutes so as to avoid any dermal infection. The fish were then washed with water and acclimatized to laboratory conditions for two weeks in glass aquaria. The physico-chemical parameters of water analyzed by following standard method suggested by APHA, (1998) and IAAB (1998).

During acclimatization the fishes were provided with a diet consisting of live earthworms. Food supply was withdrawn 24 hours prior to experimentation. A commercial grade of pesticide, Dimethoate - 30% EC was used for bioassay test.

A stock solution of the toxicant was prepared and few concentrations from stock solution were prepared as the dilution technique (APHA, 1998). For experimentation, laboratory acclimatized fishes were divided into three groups of 10 fishes per aquarium. Group 'A' served as control was kept in tap water. Group 'B' exposed to lethal and sub lethal i.e. (LC_{50} of 96 hours, and $1/10^{th}$ of 96 hours LC_{50}) concentration of dimethoate solution. and water was renewed every 24 hours in order to provide fresh oxygenated water, to maintain the concentration of dimethoate and also to remove accumulated waste. .

The fishes were sacrificed immediately at the end of exposure period and tissue like liver, body muscle, gill and kidney were excised rapidly and processed for the biochemical estimations after homogenizing the required media.

The protein contain analyzed by Biuret method (Gornall *et.al.* 1949) by using bovine serum albumin as standard. Carbohydrate estimation was done by Anthrone reagent (Seifer *et.al.* 1950). Lipid estimation was done by chloroform methanol method. Suggested by (Bling and Dyer, 1959) in chlorofom methanol extract. All values were expressed in mg 100 mg-1 and given in tabulated form.

RESULTS AND DISCUSSION-In present investigation results of biochemical studies are represented in table 1 and graphically represented in fig. No. 1 from this results it has been found that the biochemical components decreased in all exposed fishes than normal. The percent decrease in glycogen was greater followed by lipid and then proteins.

It might be due glycogen is the primary and immediate source of energy than lipid and proteins.The percent decrease of glycogen, lipids and proteins was maximum in muscle followed by gills, liver and kidney to lethal and sublethal concentration of dimethoate for 96 hours exposure.

It might be due to over exertion or activity of muscle under pesticidal stress. Similar results were reported by several workers Baig Md. Azaha *et al.* (1991), Cope *et al.* (1970), Kabeer Ahammad Sahib *et al.* (1983), Sivaprasada Rao (1980), while studied toxicity of different pesticides on fishes. Sudhanshi Tiwari *et al.* (2004) worked on toxic and sub lethal effect of oleandrin on biochemical parameters of freshwater fish, air breathing murrels *Channa punctatus* observed that the significant alteration in the level of total protein, free amino acid, nucleic acid, glycogen, lactate, enzyme protease, phosphatase, alanine aminotransferase, aspirate aminotransferase and acetyl cholinesterase activity in liver and muscle tissues. Abdul Naveed *et al.* (2006) worked on toxicity

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of lihocin on the activities of glycolytic and glycogenic enzymes of fish *Channa punctatus* observed that the level of glycogen and pyruvate decreased while glucose and lactic acid levels increased. Durga and K. Veeraiah (2002) worked on effect of cypermethrin on protein metabolism of the fish *Labeo rohita*, observed that the total protein level decreased in all the tissues tested where as the free amino aid levels were increased. Lomte and Sabhia Alam (1984) studied effect of Malathion on the biochemical components of the prosobranch, *Belamia bengalensis* and reported that the decrease in glycogen, protein and lipid under pesticidal stress.

Amanulla Hameed *et al.* (2004) studied effect of butyllin on lipid metabolism in an easturine mussel, *Sunetta scripta* and reported that tissue, significant decrease in the digestive gland was noticed and the percentage of lipid content decreased from 3.6 to 2.1, 3.7 to 1.6 and 3.2 to 1.0 at 24, 48, 72 and 96 hours respectively. Dimethoate induced alteration in biochemical composition of fish tissue under pesticidal stress. It might be due glycogenolysis, lipolysis and proteolysis to meet the energy demand.

Table 1: Different biochemical content in muscle, gills, liver and kidney of control and dimethoate exposed fish for 96 hours.

Sr.No.	Biochemical Components	Tissues	Control	Lethal	Sleuthed
1.	Glycogen	Muscle	0.2421 ±0.013	0.1702 (30%) ±0.014	0.2033 (16%) ±0.011
		Gills	0.1712 ±0.007	0.1410 (17.6%) ±0.004	0.1550 (9.4%) ±0.003
		Liver	0.9242 ±0.023	0.7912 (14.3%) ±0.028	0.8542 (8%) ±0.026
		Kidney	0.1619 ±0.005	0.1419 (12.3%) ±0.006	0.1530 (5.5%) ±0.002
2.	Lipid	Muscle	3.98 ±0.30	3.05 (30%) ±0.17	3.50 (12%) ±0.18
		Gills	4.47 ±0.20	3.88 (13%) ±0.14	4.10 (8.2%) ±0.10
		Liver	7.89 ±0.26	7.15 (9.4%) ±0.18	7.45 (5.6%) ±0.18
		Kidney	3.45 ±0.17	3.15 (8.6%) ±0.04	3.30 (4.3%) ±0.09
3.	Protein	Muscle	19.02 ±1.02	17.05 (10.4%) ±0.35	17.70 (6.9%) ±0.38
		Gills	11.07 ±0.90	10.05 (9.2%) ±0.25	10.50 (5.1%) ±0.28
		Liver	17.21 ±0.35	16.19 (5.9%) ±0.12	16.55 (2.8%) ±0.22
		Kidney	10.89 ±0.18	10.25 (5.8%) ±0.10	10.60 (2.6%) ±0.15

All Values are expressed in mg/100 mg-1weight tissues.

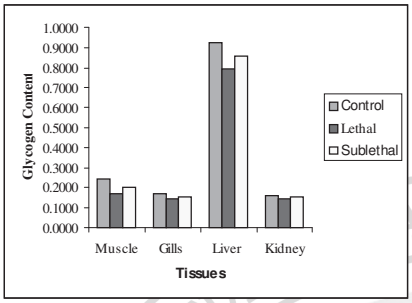

Fig. 1: Effect of lethal and sublethal concentration of dimethoate on glycogen content of muscle, gill, liver and kidney of fish following 96 hours exposure

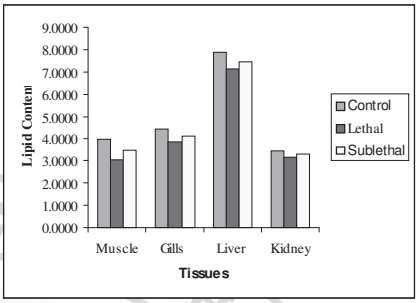

Fig. 2: Effect of lethal and sublethal concentration of dimethoate on Lipids content of muscle, gill, liver and kidney of fish following 96 hours exposure

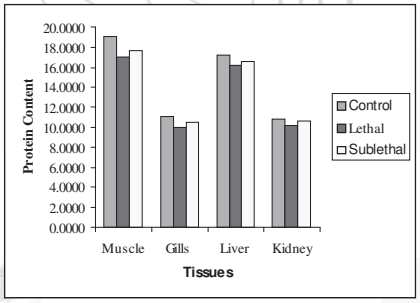

Fig. 3: Effect of lethal and sublethal concentration of dimethoate on Protein content of muscle, gill, liver and kidney of fish following 96 hours exposure

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