

Biochemical changes of fresh water fish, *Channa marulius* (Ham Buch) exposed to 3/4th Sub lethal Concentration of Cypermethrin and Fenvalerate.

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ABSTRACT

The present study is aimed to evaluate the changes in total protein, total cholesterol content and the glucose in muscle of *Channa marulius* after exposure to 3/4th sub lethal concentration of Cypermethrin and Fenvalerate. It was found that as compared to control the total proteins were reduced on other hand total cholesterol and glucose was increased with increased period of exposure to both pesticides. This study will reflect the role of these biochemical parameters for assessment of aquatic pollution as far as the natural pesticides are concerned.

Keywords: *Channa marulius*, Cypermethrin, Fenvalerate, Biochemical, Protein.

INTRODUCTION

Cypermethrin and Fenvalerate are widely used as pesticide all over the world to increase the production of food grains and other agricultural-products (Bhoi *et al.*, 2016) and there is increased risk of food being contaminated with the insecticide, which may harm humans and domesticated animals. Cypermethrin and Fenvalerate produce drastic effects in fishes (Patole *et al.*, 2016). Biochemical and physiological biomarkers are frequently used for detecting or diagnosing sub lethal effects in fish exposed to different toxic substances (Monali and Deepronil, 2017). The pesticides can severely affects the physiological and health status of the fish (Bhoi and Patole, 2018). The most toxicants exert their effects at basic level of the organism by reacting with enzymes or metabolites and other functional components of the cell. The present study aimed to determine the sub lethal effects of Cypermethrin and Fenvalerate on some selected biochemical parameters of *Channa marulius*.

MATERIAL AND METHODS

The fresh water fish *Channa marulius* weighing (15±5 g) and length (10±3 cm) were collected from Kan and Panzara river of Sakri Tahsil (Dhule). Live fishes were brought to the laboratory and thoroughly washed under tap water and acclimatized in laboratory conditions for 15 days. They were fed

with standard fish diet (Tokyu grow certified company). Water in the tank was changes after 2 days of interval. Technical grade Cypermethrin (25%) and Fenvalerate (ISAGRO ASIA), 20% (EC) were purchased from Sushil Agricultural pesticide and fertilizer Agency.

The fishes were divided into a 4 group, each group of 10 healthy fishes were transferred to plastic tough having capacity of 10 litres and they exposed separately to 3/4th sub lethal concentrations of Cypermethrin (0.18 ppm) and Fenvalerate (0.25 ppm). One group was kept as control. At the end of exposure period, fish were randomly selected for biochemical study. Tissue like

muscles was dissected out from control and experimental fishes. Estimation of total glucose was done by Phenol-Sulphuric acid method (Barham and Trinder, 1972), total cholesterol (%) with the method (Zlatkis, 1953) and total proteins (g/100g) was estimated by Lowry *et al.* (1951).

RESULTS & DISCUSSION

Glucose, Cholesterol and Protein of fresh water fish *Channa marulius* exposed to 3/4th sub lethal concentrations of Cypermethrin and Fenvalerate shown in table 1 and 2 as well as figure 1 and 2 respectively.

Table- 1: Glucose, cholesterol and protein of fish *Channa marulius* exposed to sub lethal concentrations 3/4th (0.18ppm) of Cypermethrin.

Parameters	Control	3/4 th dose concentration of Cypermethrin			
		24 h	48 h	72 h	96 h
Glucose (mg/dL) (Muscle)	42.33±1.8	50.53±1.1 (8.96) *	53.34±1.6 (13.76)**	56.86±1.4 (19.09)**	59.90±1.8 (23.20)**
Cholesterol (mg/dL) (Muscle)	123.00±2.7	133.03±2.5 (7.31)*	140.7±3.0 (12.36)**	143.73±3.2 (14.21)**	152.42±3.6 (19.10)**
Protein(mg/dL) (Muscle)	10.37±0.57	8.34±0.45 (-24.34)**	7.50± 0.41 (-38.26)***	7.27±0.10 (-42.64)***	6.56± 0.30 (-58.07)***

Table- 2: Glucose, cholesterol and protein of fish *Channa marulius* exposed to sub lethal concentrations 3/4th (0.25 ppm) of Fenvalerate.

Parameters	Control	3/4 th dose concentration of Fenvalerate			
		24 h	48 h	72 h	96 h
Glucose mg/dL) (Muscle)	42.33±1.8	46.50±1.5 (8.96) *	49.34±1.2 (14.20) **	58.86±1.6 (28.08)**	61.90±1.5 (31.61)**
Cholesterol (mg/dL) (Muscle)	146.00±2.7	149.03±2.4 (0.020) NS	150.7±2.3 (1.12) NS	152.43±3.6 (2.25)*	154.73±3.1 (3.70)*
Protein (mg/dL) (Muscle)	10.36±0.57	10.03±0.46 (-3.29) NS	8.09± 0.42 (-28.05) **	8.01±0.10 (-29.33)* *	7.53± 0.31 (-37.58)***

Mean ± S.D. values differ significantly (p<0.05) within same column.*Significant value: p<0.05, ** p<0.01, *** p<0.001. NS = Non-Significant (p>0.05). Values in the parenthesis are percentage change over control treated as 100 per cent.

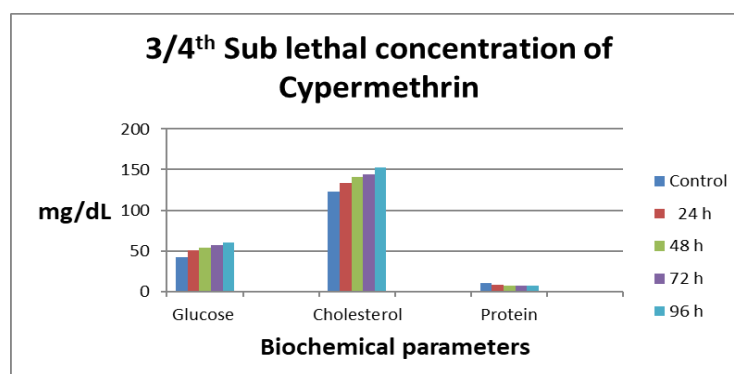


Figure 1: Glucose, cholesterol and protein content of fish *Channa marulius* exposed to sub lethal concentrations 3/4th (0.18 ppm) of Cypermethrin.

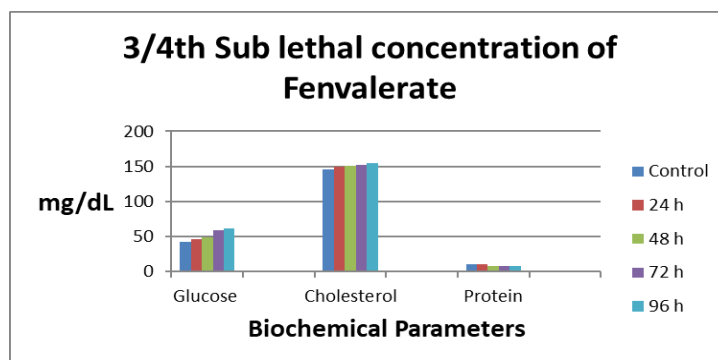


Figure 2: Glucose, cholesterol and protein content of fish *Channa marulius* exposed to sub lethal concentrations 3/4th (0.25 ppm) of Fenvalerate.

Cypermethrin

The amount of glucose in the fish exposed to 3/4th sub lethal concentration of Cypermethrin recorded as 42.33, 50.53, 53.34, 56.86 and 59.90 mg/dL in control, 24 h, 48 h, 72 h and 96 h of exposure respectively. It was found that the glucose levels were increased significantly as compared to control groups. Similarly the amount of cholesterol for control, 24 h, 48 h, 72 h and 96 h was found to contain 123.0, 133.03, 140.7, 143.73, and 152.42. These figures show the level of cholesterol was found to be increased. On other hand, the protein content in the fish after exposed to 3/4th Cypermethrin was found to contain 10.37, 8.34, 7.50, 7.27 and 6.56 mg/dL of protein in control, 24 h, 48 h, 72 h and 96 h respectively. Protein content was decreased significantly than control groups.

Fenvalerate

The glucose level in 24 h, 48 h, 72 h and 96 h exposure was found to contain 46.50, 49.34, 58.86, 61.90 mg/dL and in control it was found to be 42.33 mg/dL. Glucose content was increased significantly when compared to control groups. Whereas the amount of cholesterol in the fish after exposed to 3/4th Fenvalerate was found to contain 149.03, 150.7, 152.43 and 154.73 and mean control was 146.00 mg/dL for 24 h, 48 h, 72 h 96 h and control respectively. The Cholesterol was found to be slightly increased. The amounts of total protein were found to be as 10.36, 10.03, 8.09, 8.01 and 7.53 mg/dL in control, 24 h, 48 h, 72 h and 96 h respectively. It means the values of total protein were decreased significantly.

Biochemical parameters are sensitive index to change due to pesticide toxicity and can constitute important tools in toxicological studies (Balarko *et al.*, 2012). Hence, the purpose of this work is to evaluate the 3/4th

sub lethal effect of Cypermethrin and Fenvalerate on some selected biochemical parameters. Result showed that glucose and cholesterol increased significantly as the concentration of the toxicant increases. Similar result was recorded by Ojutiku *et al* (2013). They revealed that a significant increase in glucose and cholesterol level in the *Channa marulius* exposed to 3/4th sub lethal concentration of Cypermethrin and Fenvalerate insecticide. This result was also corroborated by the findings of Vishal (2012); Pallavi *et al* (2016); Sharmila and Kavitha, (2017). The decrease in protein during Cadmium chloride and Rogar exposure may be due to increased catabolism and decreased anabolism of proteins in *Oreochromis niloticus* and *Channa striatus* (Al-asgah *et al.*, 2015; Bhandare *et al.*, 2016)). Mohamad *et al* (2016) reported that cholesterol and glucose were increased significantly and total protein were decline in common carp, *Cyprinus carpio* exposed to Cadmium and Lead. The decreased of protein under the Cypermethrin and Fenvalerate stress noticed in the present study may be due to the utilization of amino acids in the various catabolic reactions. Decrease in protein content may be due to increased proteolysis (Chandra *et al* 2017; Subburaj *et al.*, 2018)) or it may be due to metabolic utilization of the ketoacids to gluconeogenesis pathway for synthesis of glucose (Mehra and Singh, 2018 and Naji *et al.*, 2018). Alaa *et al* (2018) found that the levels of glucose and cholesterol were increased in Nile tilapia, *Oreochromis niloticus* and African fish *Clarias gariepinus*. Al-Otaibi *et al* (2019) showed that elevated level of glucose in cat fish, *Clarias gariepinus* exposed to diazinon. The level of blood glucose and cholesterol were significantly increased while proteins were decreased significantly observed by earlier workers viz; Sehzad *et al* (2019); Mari *et al* (2019) and Okey, (2019).

CONCLUSION

Cypermethrin and Fenvalerate are important insecticides in agriculture; their toxicity to aquatic fish has been ascertained as a result of flow from agricultural land near aquatic rivers or lake because of irrigational farming. The evidence of effect on some biochemical parameter in the blood and organs of the fish should make us reduce its incidences into aquatic bodies.

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Conflicts of interest: The authors stated that no conflicts of interest.

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