BIOCHEMICAL CHANGES OF MERCURY CHLORIDE ON BLOOD METABOLITE LEVELS OF A FRESHWATER FISH, *LABEO ROHITA*

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ABSTRACT

Rohu (*Labeo rohita*) is a fish of the carp family Cyprinidae, found commonly in rivers and fresh water lakes in and around South Asia and South - East Asia. The freshwater fish *Labeo rohita* were exposed to Mercury chloride (0.25 ppm) for 10, 20 and 30 days and its effect on blood – bio chemical properties in the form of hyperglycemia, hypoproteinemia and hypercholesteromia. The results of the present study that the blood – biochemical changes may lead to the fish morbidity and mortality.

Keywords: *Labeo rohita,* blood glucose, serum protein and serum cholesterol.

1. INTRODUCTION

Water is the home of the fish and its quality is one of the most over looked aspect of pond management until it affects fish production. Water quality generally means the component of water which must be present for optimum growth of aquatic organisms (Ehiagbonare and Ogundiran, 2010). Heavy metals have been announced to exert a vast range of metabolic, physiological, ecological and behavioral influences on fish (Soengas *et al.,* 1996). Mercury is non biodegradable and non - advantageous heavy metals and their role in the cell is not understood (Bailey *et al.,* 1999). It enters the food was through bacteria, algal and fishes of freshwater and marine water etc. as compared to land animals (Gupta, 1998). Examinations on the toxic effect of metals on fish are joined by the analysis of exchanges in some haematological and biochemical blood indices (Hoyle *et al.,* 2007).

Objectives

- To observe the LC_{50} concentration of mercury chloride to the fish, *labeo rohita*
- To observe the effect of sublethal concentration of Mercury chloride on biochemical characteristics in blood of the fish, *labeo rohita*

2. MATERIALS AND METHODS

2.1. Experimental fish – Labeo rohita

2.2. Test toxicant – Mercury chloride

A static bio - assay test was done to determine LC_{50} of Mercury chloride to *Labeo rohita* following the method of APHA (1985) and sublethal concentration was calculated by adopting the formula of Hart *et al*. (1945). For each experiment the fish (average length 8-8cm and wt. 26-28gm) were exposed to a sublethal concentration of mercury chloride (0.25 ppm) for a period of 10, 20 and 30 days. Side by side a control was also run in equal volume of water. The exposure medium was renewed every 24 hours. At the end of exposure period (10, 20 and 30 days) the fish were anaesthetized with 1:4000 MS 222 (tricane methane sulphonate sandoz).

- Estimation of blood glucose : Sinha (1990)
- Serum protein : Varley *et al*. (1980)
- Serum cholesterol : Karbara's method (1966)

3. RESULTS AND DISCUSSION

The fish *Labeo rohita* under 10, 20 and 30 days exposure of mercury chloride shows hyperglycaemic, hypoproteineric and hypercholesterolenic response. The blood glucose level elevated to 80.62 ± 1.5mg/100ml of blood against the control value of 50.76 ± 3.9 mg/100ml. The amounts to an increase by 58.82 % (Table 1). The protein depletion shows hypoproteinemia which depleted to 3.83 ± 1.4 g/100ml of blood against the control value of 7.15 ± 0.37 g/100ml of blood. The amount decrease by 46.43 % (Table 1). The serum cholesterol elevation shows hypercholesterolemic response which elevates to 289.4 ± 2.08 mg/100ml of blood against the control value of 247.5 ± 0.37 mg/100ml of blood. This amount are increased by 16.92 % (Table 1).

3.1. Blood glucose

Rita & Milton *et al*. (2006) observed hyperglycemia in fish. The increase in the blood sugar level under 30 days treatment might be because of stimulation of a cells of islet of Langerhan's which secrete and much amount of glucagons in turn had an action upon liver glycaogen with consequent enhanced glycogenolysis and the resultant hyperglycemia.
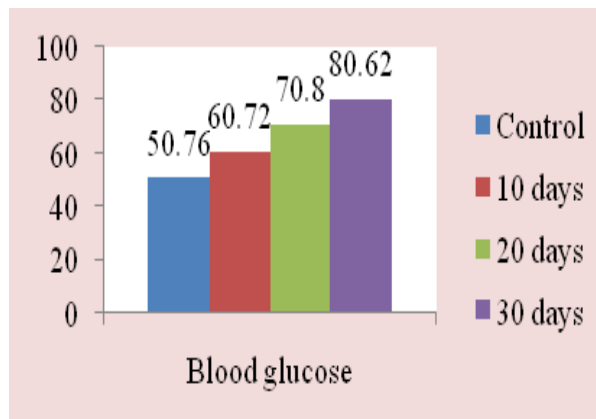

Fig. 1. Changes in the blood glucose levels in *Labeo rohita* exposed to sublethal concentration of mercury chloride.

Table 1. Changes in the blood metabolite levels in *Labeo rohita* exposed to sublethal concentration of mercury chloride.

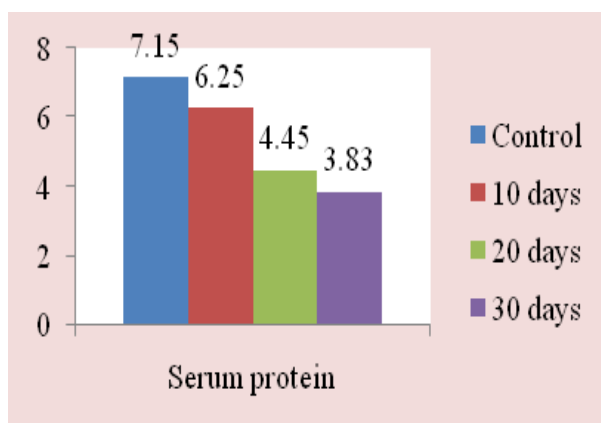| Parameter	Control	10 days	20 days	30 days
Blood glucose (mg/100ml)	50.76 ± 3.9	60.72 ± 0.8	70.80 ± 0.9	80.62 ±1.5
% change		+19.62%	+39.47%	+58.82%
Serum protein (g/100ml)	7.15 ± 0.37	6.25 ± 0.4	4.45 ± 0.8	3.83 ± 1.4
% change		-12.58%	-37.76%	-46.43%
Serum cholesterol (mg/100ml)	247.5 ± 0.37	265.0 ± 1.6	276.8 ± 1.9	289.4 ± 2.08
% change		+7.07%	+11.83%	+16.92%

Fig. 2. Changes in the serum protein levels in *Labeo rohita* exposed to sublethal concentration of mercury chloride.
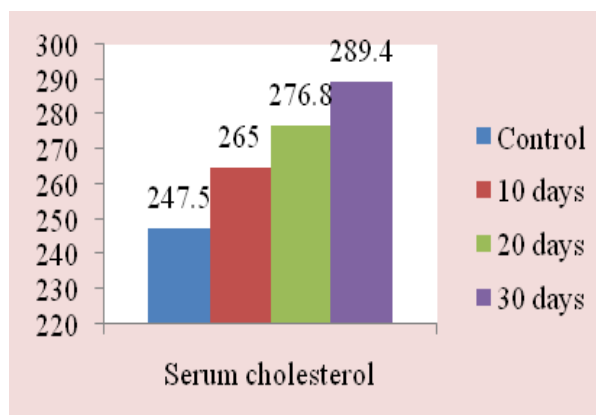

Fig. 3. Changes in the serum cholesterol levels in *Labeo rohita* exposed to sublethal concentration of mercury chloride.

3.2. Serum protein

Rekha Rani *et al.* (2008) observed hypoproteineric in fish. The liver cells might have reduced or stopped the synthesis of serum protein due to direct toxic effects of the mercury chloride and the serum protein would have been utilized under heavy metals induced stress leading to their depletion.

3.3. Serum cholesterol

Rekha Rani *et al.* (2008) observed hypercholesterolenic in fish. This might be attributed to the utilization of the volatile fatty acids by damaged liver parenchyma and ultimate entry to the circulation or to decreased excretion of cholesterol by damaged liver.

4. CONCLUSION

Mercury chloride proved to be highly toxic at sublethal concentration of 0.25ppm where 100% mortality was observed after 60 days exposure. The results of the present study that the blood – biochemical changes may lead to the fish morbidity and mortality.

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