



Haematological Alterations in '*Labeo rohita*' Due to Heavy Metal Toxicity

Dr. B. S. Salve

Associate professor & Head, P. G. Department of Zoology

Adarsh Education Society's Arts, commerce and science college, Hingoli-431513, India.

Email:-dr.salvebs@gmail.com

Abstract: The present work is concerned with the effect of heavy metal pollutant, mercuric chloride induced hematological alterations in freshwater fish *Labeo rohita* Mercuric chloride after a short term and long-term exposure to induced significant changes at sub lethal concentration. The results showed a decrease in parameters like RBC, WBC and Hb at short term exposure while WBC increased during long term exposure.

Key Words: Mercuric chloride, hematological parameters, *Labeo rohita*

Introduction:

There is vast array of wastes generated through industrial processes. Heavy metal wastes are passed into aqueous systems through industrial effluents, sewage disposal, soil leaching and rainfall. These wastes are directly dumped into surrounding fresh water bodies which include rivers, reservoirs, ponds etc. The concentrations of these heavy metals are sub lethal or lethal to aquatic organisms during prolonged exposure. (Eisler and Gardener., 1973). This unchecked and untreated effluent proves to be most detrimental for aquatic flora and fauna especially for fresh water fishes as they cannot escape from ill effects of pollutants (Clarkson, 1998). The aquatic organisms are the sources of indicators due to their sensitivity to any change in a short term or long term exposure to such pollutants (Parashar and Banerjee, 2002). The changes in aquatic environment manifest upon the hematological parameters of fish. The present study is concerned with short term and long-term exposure of mercuric chloride on *Labeo rohita* for bio assay experiments using this fish as test organism under controlled conditions and by taking precautions and procedure as given by APHA (1980). Present work carried from January 2019 to December 2019

Materials and Methods:

Fresh fishes were collected from local fishermen in Hingoli, Maharashtra. The fishes were brought to laboratory, washed and treated with 0.02 % KMnO₄ to remove any undesirable infection. For proper acclimatization, they were kept in laboratory for 15 days before experimentation. Only healthy and medium to large sized fishes of length 25-40 cm and weight 70-100 gm were selected for the study. The tube well water was used for the entire work which was refreshed at regular intervals. The physico-chemical parameters of water were maintained with temperature range

between 27-30 OC, pH 7.2-7.4, and Dissolved oxygen 6.8-7.3 ppm, total hardness 438-470. The LC50 value of mercuric chloride was estimated by Finney method (1964).

In the present investigation, the sub lethal concentration of toxicant selected was 1/5th dose of LC50 and were 96 hours for short term and 30 days for long term exposure. Acute toxicity tests are conducted to measure the impact of toxicity on the fishes within a short period. (Sprague, 1969). The sub lethal concentration of mercuric chloride at 96 hours was found to be 0.58 ppm. The fishes were divided into two groups, one control and the other experimental groups. The haematological parameters were determined by collecting the blood from the heart of fish. RBC and WBC count were studied by using improved Neubaur's counting chamber. Haemoglobin was measured by Sahli's haemometer. The values for RBC and WBC were expressed as millions per cubic millimeter and gram percentage for Hb. Each value was recorded on the basis of Mean \pm SD of six individual observations.

Results and Discussion:

The results obtained for various haematological parameters are as follows:-

RBC: The treatment of mercuric chloride to the selected fish showed a significant decrease in RBC value during short term from 1.72 ± 0.37 to 1.22 ± 0.20 . There was also a similar decrease in RBC for long term exposure from 1.66 ± 0.17 to 0.80 ± 0.63 . Similar results were shown by Maheswaran et.al (2008) in *Salyelinus fontalis*, Haux and Larsson (1982) in *Anguilla anguilla*.

WBC: There was a slight decline in WBC value for short term exposure from 6.47 ± 0.51 to 4.36 ± 0.33 while in contrast, there was an increase in the value from 6.41 ± 0.82 to 9.71 ± 0.51 during a long-term exposure. Similar increase in value of WBC was reported by Mehjbeen and Nazura (2012) in *Mastacembelus armatus*. Similar results were also reported by Karupphasamy et.al. (2005) in *Channa punctatus* on cadmium exposure. The increase in WBC indicates damage due to infection of body tissues and severe physical stress.

Hb: The Hb value shown a decrease in both short term and long-term exposure. It decreased from 14.07 ± 0.45 to 9.09 ± 0.16 during short term exposure, while a decrease from 13.87 ± 0.54 to 6.96 ± 0.43 had been reported. Similar results were reported by Goel and Sharma (1987), Atmanalp and Yanki (2003). The decrease in Haemoglobin percentage may be due to reduced oxygen carrying capacity of the treated fish with the given pollutant. The haematological studies had also been conducted by Blaxhall (1972), Mishra and Srivastava (1979) and Tort and Torres (1988). Values of Different Haematological Parameters in *Labeo rohita* exposed to Mercuric Chloride are shown in table no.1. Graphical representation shown in graph no.1 and 2.

Table 1: Values of Different Haematological Parameters in *Labeo rohita* exposed to Mercuric Chloride

Parameters	Short term (96 Hrs)		Long term (30 days)	
	Control	Treated	Control	Treated
RBC (10^6 mm^3)	1.72 ± 0.37	1.22 ± 0.20	1.66 ± 0.17	0.80 ± 0.63
WBC (10^6 mm^3)	6.47 ± 0.51	4.36 ± 0.33	6.41 ± 0.82	9.71 ± 0.51
Hb (%)	14.07 ± 0.45	9.09 ± 0.16	13.87 ± 0.54	6.96 ± 0.43

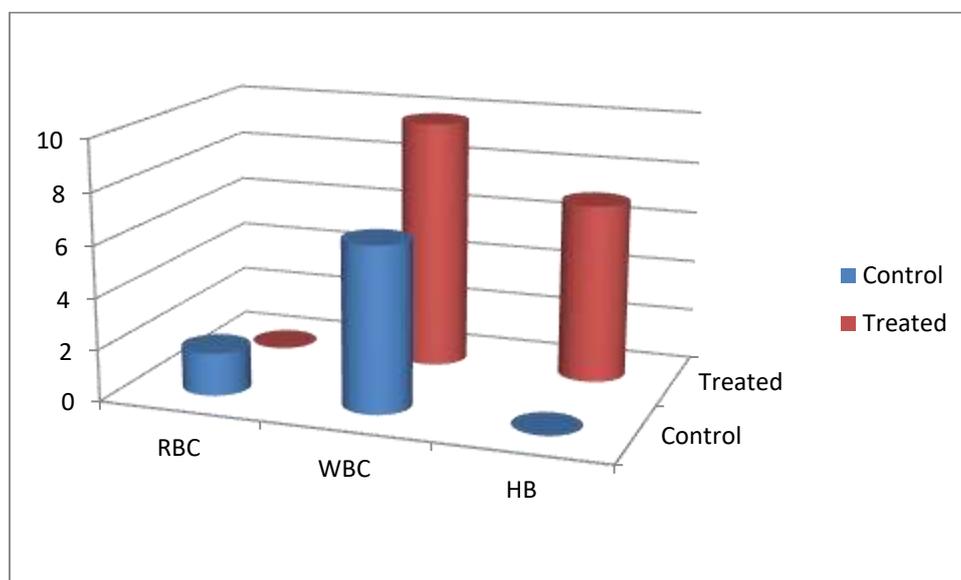


Fig 1. Graph for short term expose (96 hours)

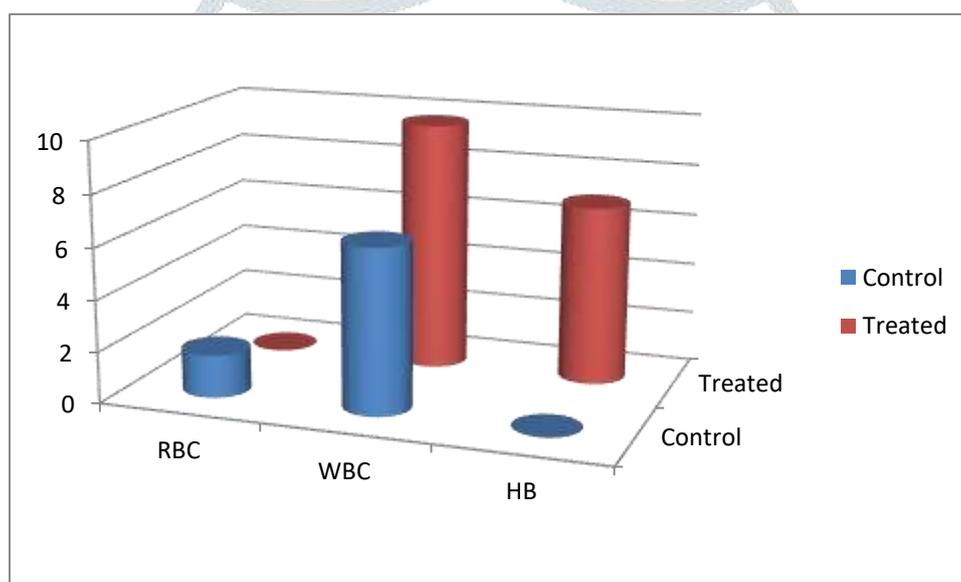


Fig 2. Graph for long term expose (30 days)

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