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Full Length Research Article

TOXICITY OF CADMIUM IN HAEMATOLOGICAL PARAMETER TO INDIAN MAJOR CARP (*LABEO ROHITA*)

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ABSTRACT

The aim of this study was to assess the effect of heavy metal cadmium on haematological parameter. The Indian major carp Labeo rohita was exposed to sub lethal concentration of cadmium for various exposure periods 10, 20, 30, day haematological parameter on RBC, WBC, and Hg, were measured both in control and experimental fish. During various exposure period's day. The 10, 20, 30, of RBC, WBC, and Hg levels were significantly elevated in the experimental fish over the control and the WBC level was decreased significantly in experimental fish. Keywords: cadmium, haematological parameter, Labeo rohita.

Key words:

INTRODUCTION

Aquaculture is one of the important sectors contributing significantly in the Indian economy. Fish culturists are encouraged towards intensification of culture system to increase production and profit. In such practice of fish and shrimp farming, disease becomes major threats. Disease is one of the most important constraints of fish production both in culture system, as well as in wild condition (Sivasankar, 2015). Fish production is decreased due to the occurrence of disease caused by different pathogens in aquaculture. Viral diseases have posed significant problems in aquaculture for many years. In commercial aquaculture, antibiotics were used for prevention and control the diseases, and hormones were used for growth performance but the cost of antibiotics and hormones are expensive. Several studies have been carried out to find the new compounds from plant sources at cheap and best to prevent the disease causing organisms in aquaculture (FAO, 1998). The cage aquaculture sector has grown very rapidly during the past 20 years and is presently undergoing rapid changes in response to pressures from globalization and growing demand for aquatic products in both developing and developed countries. It has been predicted that fish consumption in developing countries will increase by 57 percent, from 62.7 million metric tons in 1997 to 98.6 million in 2020 (Delgado, 2008). Aquaculture productivity constitutes significant portion of national income in many countries of Asia. Large scale mortalities of fish often occur in ponds and loss is due to environmental pollution stress followed by microbial infection (Abbas, 2002). Heavy metals are persistent contaminants in the environment that come to the forefront of dangerous substances such as cadmium, lead, mercury, copper and zinc causing serious health hazard in humans and animals (Bahnasawy, 2001 and Burke, 2007). The agricultural and industrial wastes, partially treated or without treatment are being discharged into surface water (Gad, 1986 and Matsubara, 1985). Such metals are absorbed from polluted water through gills, skin and digestive tract of fish by bioconcentration and bio-magnification. The bioaccumulation of heavy metals in the different fish tissues had been studied by several investigators. Heavy metals accumulate in fresh water and elevate through the food chain. The patterns of bioaccumulation of heavy metals are determined by the absorbance and excretion rates of fish. Different factors such as physical and chemical properties of water as well as seasonal changes are the reason of significant augmentation of metals in different fish tissues. Hence, the present study has been carried out the Haematological studies on disease induced Indian major carp; *Labeo rohita* (L) fed with Datura stramonium formulated diet of plant extract. Materials and Methods A live fish (12± 1g) were collected from Poondi reservoir, Tamil Nadu, India. The fishes were maintained in non-chlorinated water in 20 day. The ground nut oil cake, fish meal and rice bran, tapioca, soybean, were mixed and sterilized and mixed to a multivitamin tablet and different concentrations 0.2ppm, 0.4ppm and 6.0ppm) of Datura stramonium extract used for experimental fishes and without plant extract diet for control fish. The food was made into small pellets. In every eight in days following haematological studies such as, (Table 1) RBC Count. This methods is followed by (Wintrobe, 1934).

$$\text{Number of RBCs/mm}^3 = \frac{\text{Number of RBC counted x200x10}}{\text{Area of chambers counted}}$$

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This methods is followed by (Dhayanithi et al., 2013)

$$\text{Number of WBCs /mm}^3 = \frac{\text{Number of WBC x Dilution}}{\text{Area counted x depth of the fluid}}$$

Haemoglobin Content. This methods is followed by (Blaxhall and Diasley, 1973).

RESULTS

In the present study the haemoglobin content, RBCs and WBCs were studied in disease induced *Labeo rohita* using different concentrations of Datura stramonium plant extract. The RBCs count in the control groups was found to be 51.7±1.52 x106 cells/ml. The plant extract treated fishes showed the RBCs 55.0±1.0 x106 cells /ml (0.4ppm) 54.0 ±1.00x106 cells /ml (0.6ppm) and 55.0±1.00x106 cells /ml (2.0g) in the initial day (0 day). The RBCs count was increased with increasing concentration of plant extract formulated diet in different day of treatment (7, 14, 21 and 28). In the present study the WBCs count was varied from both experimental and control fishes. The WBCs count in the control fishes showed 20.3±1.52×103 cells /ml and the plant extract 5 formulated diet treated fishes showed maximum number of WBCs was observed. In 1.5g plant extract formulated diet found to be 27.0±1.00×10 3 cells /ml in the initial day (0day) and 31.0 ±2.0 ×103 cells /ml (35 day). Haemoglobin content on disease induced India major carp *Labeo rohita* fed with Datura stramonium formulated diet were studied in different days of treatment (0 day to 28 day). In the control fishes showed low level of haemoglobin content (6.30±0.05g/dl) when compared to negative control fish (5.33±0.15g/dl). Different concentrations of plant extract formulated diet treated fishes showed gradual increase in haemoglobin content after different days of treatment.

DISCUSSION

In this present investigation the signification decreased in the various parameter of blood was observed in Indian major carp *Labeo rohita* due to the treatment of different toxicant for short durations. The haematological parameter in fish can significantly change in response to chemical stressors. However, there alterations are nonspecific to a wide range of substance. In recent years haematological parameters have been used more to assess the effect of sub lethal concentrations of pollutants (Webemeyer, 1977). In the present study, the RBC count decreased significantly in the cadmium treated fish. The decreased in RBC count during lethal exposure to cadmium is due to exaggerated disturbance that occurred in both metabolic and haemopoietic activity of fish exposed to the pollutant (Panigrahi1978). The results of the present investigation show that the sodium arsenic treatment inflicted a drastic reduction in the total count of the RBC which shows a dosage dependent effect (Shah, 2004). Reduction in haemoglobin percentage and RBC count of the fish Anabas scandens treated with mercury is also reported earlier. Decreased level in RBC count and Hg content was observed in fish Tincatinca exposed to mercury, cadmium and lead [15, 16] Observed by increased WBC counts in Oreochromis aureus after mercury exposure (Joshi, 2002), also reported the decrease level of RBC in the fresh water fish *Labeo rohita* after exposure to mixture of heavy metals. All these reports are in agreement with the present study. The reduction in total RBC count and Hb have suggested that heavy metal exposure decreases the total RBC count, and Hb content due to impaired intestinal absorption of iron (Gill, 1985). Increase in WBC content observed in the present study could be attributed by stimulation of the immune system in response to tissue damage caused by sodium arsenate (Dhanekar, 1985).

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