Effect Of Heavy Metal, Nickel on Haematology of Fresh Water Fish, *Channa Punctatus*

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Abstract- ***The haematological parameters like RBC counts, Haemoglobin %, Monocytes, Eosinophil and Basophil were significantly decreased whereas WBC counts, Lymphocytes and Neutrophil were significantly increased in nickel exposed fishes. The results indicate that nickel is toxic at higher concentration. The fish species is therefore recommended as good bioindicator for the risk assessment of aquatic environment due to nickel.***

Indexed Terms- Heavy metal, Nickel, Haematology, Channa punctatus

I. INTRODUCTION

The universal problem is the environmental pollution and most important pollutants are the heavy metals in aquatic network because of their toxicity, accumulation and bio-magnification by marine creatures. Domestic, industrial and anthropogenic activities may broadly become the source of natural aquatic systems contamination of heavy metals. The heavy metal pollution have dreadful effects on the environmental equilibrium and a variety of aquatic animals like fish. Heavy metals in fish come mainly from their diet, and levels of bioaccumulation of contaminants are higher in fish which comes higher in food chain. Processed water from the, detergent, textile and cosmetic industries present near the river water have high concentrations of heavy metals, which cause the disruption of the ecological balance of river water if present in much higher concentrations.

Blood is one of the most sensitive indicators of stress condition of an animal. It is highly susceptible to internal and external environmental fluctuations. In all aquatic animals, fishes are the most sensitive and best indicator of water pollution. The main route of entry for any toxicant in fishes is through gills. From the gill it is transported to other parts of the body through the blood stream, hence blood provides an ideal medium for toxicity studies. The change in the total number of blood cells both erythrocytes and leucocytes and haemoglobin factors assume considerable significance as a measure of response of the body to the adverse environment. Fish is an important source of protein and easily digestible food for human being. It plays a vital role to fulfill our nutritional requirement.

Several studies have been conducted in assessing the toxicity of heavy metals on different fish species (Srivastava and Mishra, 1979; Flos *et al*, 1987; Annune *et al*, 1994). Perusal of literature reveals paucity of information on acute toxicity of nickel on the haematological parameters of freshwater edible fishes. Hence the present study was undertaken to examine the toxic effects of nickel on the haematological parameters of freshwater snake headed fish, *Channa punctatus.*

II. MATERIALS AND METHODS

The healthy *Channa punctatus* ranging from 8.0-9.0 cm in length and 8.0-9.0 g in weight were collected from local fish ponds and washed with 1% solution of $KMnO_4$ for five minute and then transferred to the plastic jar containing 50L dechlorinated tap water for acclimatization. Fishes were acclimated to laboratory conditions for 7 days at room temperature. Based on 96 LC_{50}, fishes were exposed to sublethal concentrations (5mg/L and 10mg/L) of nickel chloride for the period of 10 days. A control group was maintained in an identical environment. The fishes were regularly fed with commercial food and the medium was changed daily to remove faeces and food remnants. Five fishes from each set were sacrificed for the collection of blood. Blood samples of these fishes were collected from caudal vein in the glass tubes. Blood parameters like RBC count, WBC count and Hb, were calculated following the methods of Dacie and Lewis (1977).

RESULTS AND DISCUSSION

Table1. Effects of sublethal concentration of nickel chloride on haematological parameters of *Channa punctatus* after 10 days exposure (n=5)

Parameters	Control (Mean± SE)	5mg/L(Mean±SE)	10mg/L(Mean±SE)
RBC (10^6/mm^3)	1.65±0.15	1.44±0.05*	1.30±0.8*
WBC (10^3/mm^3)	7.47±0.07	8.15±0.15	8.54±0.11**
Hb (g/dl)	14.21±0.84	8.92±0.08	8.42±0.67**
Lymphocytes %	76.4±2.11	78.4±1.78	80.4±1.67*
Neutrophil %	11.9±1.11	12.8±1.02	13.2±0.98*
Monocytes %	7.8±0.78	6.5±0.84*	5.2; j±0.73**
Eosinophil %	3.5±0.32	2.6±0.28	1.6±0.21*
Basophil %	0.5±011	0.3±0.14	0.2±0.11*

*= significance at 0.05level; ** = significance at 0.01 level.

The haematological parameters like RBC counts, Haemoglobin %, Monocytes, Eosinophil and Basophil were significantly decreased whereas WBC counts, Lymphocytes and Neutrophil were significantly increased in nickel exposed fishes. The results indicate that nickel is toxic at higher concentration. Similar significant decrease in RBC count and haemoglobin% age of *Channa punctatus* to subleathel concentration of heavy metal has been reported by Annune (1994). The reduction in RBC counts and haemoglobin % was found to cause macrocytic anemia as noticed in fishes by Srivastava *et.al.* (2007). The increase in total WBC count from the normal level is in line with those recorded in fishes exposed to toxicant (Srivastava and Mishra,1979). This could cause stimulation in the defense mechanism against infection in the species studied.

In the differential leucocytes count, a sharp significant increase was observed in the percentage of lymphocytes. This is an agreement with the findings of Samprath *et al.* (1993) when they exposed the Nile tilapia, *O. niloticus* to a toxic environment. This they attributed to stimulation of the immune mechanism of the fish to eliminate the effects of the pollutants. The significant decrease in eosinophils and neutrophils are in agreement with the findings of Sharma and Gupta (1984) when *Clarias batrachus* were exposed to carbon tetrachloride. This was attributed to tissue damage.

CONCLUSION

Exposure of *Channa punctatus* to nickel revealed significant changes in the haematological parameters. Majority of these parameters significantly altered with increasing concentrations of nickel chloride. This alteration is capable of changing the metabolic function of the fish. This indicates that nickel, in all its bioavailable form, when introduced in excess into aquatic system is capable of affecting aquatic life negatively. Thus, from the present study it may be concluded that air breathing fish, *Channa punctatus* is sensitive to nickel toxicity and can be used as indicators of nickel related stress in the fish on exposure to elevated nickel levels in the water.

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