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Haematological changes in fish *Heteropneustes fossilis* under vanadium stress

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ABSTRACT

Vanadium toxicity to fish *Heteropneustes fossilis* (Bloch) was studied for a period of two weeks. Haematological parameter like Total Erythrocyte Count (TEC), Haemoglobin (Hb) and Total Leucocyte Count (TLC) altered significantly ($P < 0.001$) in fish when exposed to 1,4, and 7 ppm of Vanadium ($NaVO_3$). Absolute value like MCH changed in accordance with the above parameter.

Key Words: Seasonal changes, *Chiloscyphus gollani*, *Solenostoma crenulata*, *Fossombronia himalayensis*, inverse relation.

INTRODUCTION

Vanadium is a rare element found mostly in coal & crude oil deposits. It is used as steel additives and alloys .The average level of vanadium in the earth crust is normally 100-150 ppm and known to found in living organisms also(Gummow, 2011). Toxicological effect of vanadium in mammals is well documented(Cheng et al.,1982).However effect of vanadium specially on aquatic organism is meager. Hence an attempt was made to study the effect of vanadium on haematological parameters of air breathing fish *Heteropneustes fossilis* (Bloch)

Materials and Methods

Heteropneustes fossilis , the common Indian cat fish ranging a length of 14-16 cms and 20-22 g in weight were procured from local fish pond. They were acclimatized to laboratory condition in glass

aquaria (1.5 x1.0x0.6m) for a period of seven days to recover from the stress which might have occurred during catching and transportation. Fishes were fed with commercial fish food having balanced diet. After determining the $L C_{50}$ value of Vanadium (13.2ppm) , experimental group of four were selected with 0 ppm ,1 ppm , 4 ppm, & 7 ppm concentration of vanadium.0 ppm was the control group .Fishes were kept in each aquaria at the start of experiment. The exposure period was two weeks. During the experiment period fishes were fed regularly with continuous aeration. At the end of exposure period blood was drawn from the gill region with the help of heparinized needles and stocked in heparin coated glass vials. Haematological parameters like haemoglobin (Hb), total erythrocyte count (TEC) and total leucocyte count (TLC) were done by the standard methods (Dacie and Lewis, 1975). Absolute value like mean cell haemoglobin concentration (MCH) was calculated from the above findings. Data were analysed by ANOVA.

RESULTS AND DISCUSSION

Results on the effect of vanadium on blood of *Heteropneustes fossilis* presented in the table-1. The haematological variables altered significantly ($p<0.001$) on vanadium exposure. There was a significant ($p<$

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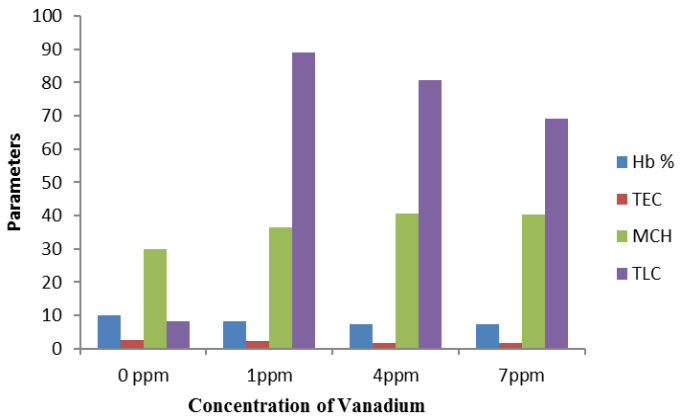
0.001) decrease in haemoglobin concentration in 1, 4 & 7 ppm vanadium exposed fish. The decrease in haemoglobin concentration is in relation with total erythrocyte count. There was a positive correlation (r=0.98) between Hb and TEC which indicates anaemia. Normally anaemic condition is marked when fishes are exposed to heavy metals (Nanda et al 1996, Bannerjee et al, 1988). However mean cell haemoglobin concentration is increasing in vanadium exposed fish.This clearly indicates more erythrocyte destruction in comparision to haemoglobin loss. This may be due to increased destruction erythrocyte leading to haemolytic anaemia (Sharma & Gupta, 1982). The total leucocyte count showed significant ($p<0.001$) increase from the control value. This increase in TLC level attributes to the immune response in vanadium exposed fish. Leukemia was also marked when fishes were exposed to heavy metals (Nanda et al. 1996). Thus this alteration in haematological levels of *Heteropneustes fossilis* indicates the stressful condition of fish under vanadium toxicity.

Table-1: Haematological alteration in cat fish *H. fossilis* exposed to Vanadium (15 days)

Parameters	0ppm	1ppm	4ppm	7ppm
Hb (g%)	9.9±0.34	8.2* ±0.12	7.5* ±0.24	7.4* ±0.88
TEC ($x10^6.mm^{-3}$)	2.74±0.03	2.25* ±0.02	1.85* ±0.02	1.83* ±0.02
MCH (pg)	29.92±1.26	36.44* ±1.41	40.50* ±1.63	40.48* ±1.52
TLC ($x10^6.mm^{-3}$)	8.25±0.87	89.1* ±3.92	80.6* ±4.51	69.1* ±3.12

* indicate significant ($p < 0.001$)

Figure-1: Comparative analysis of alterations in haematological parameters of cat fish *H. fossilis* exposed to Vanadium (15 days)



Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

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