JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Hematological Study Of Freshwater Catfish, *Clarias batrachus* Exposed by Aluminum Sulfate

P.S.Bele [1] B.S. Kamble[2]

[1]Department of Zoology, Arts,Commerce and Science College, Gangakhed, Maharashtra, India

[2]Department of Zoology, Maharashtra UdayagiriMahavidyalaya,Udgir, Maharashtra, India

ABSTRACT:

The fishes are the main supply of cheap and healthy protein to a large percentage of the world's population.The use ofaluminum sulfate in industrial sectors as fungicide, disinfectant and antiseptic in medicines as an intermediate in production of other compounds. Chemicals cause the toxicity of aquatic ecosystem has gained increasing attention in recent duration. Toxic effect of the chemicals may be physiological, biochemical and pathological in nature (Stephenson, 1987).The changes produced by toxic chemical may be complex, damage one or different organs, tissues or cells.Blood counts help evaluate diets because the number of erythrocytes responds more quickly to some dietary deficiencies than does the condition factor or growth rate. Alert biologists who might interpret observed anemia as indicator of poor nutrition could avert high mortalities attributed in part to adequate diets and heavy metal toxicities in aquatic biodiversity.

Concentration of toxicant in aquatic biota is known to cause several structural, behavioral, pathological and functional changes in aquatic biota especially in fishes. Fishes are the main biotic components of any aquatic ecosystem hence they are selected for haematological study. Chemicals produces many adverse effect on many non-target species (Turkamen et al.,2009, Prashanth et al.,2005).

Keywords:- Aluminum sulfate, *Clarias batrachus*, Haematological evaluation.

Introduction:-

Blood counts help evaluate diets because the number of erythrocytes responds more quickly to some dietary deficiencies than does the condition factor or growth rate. Alert biologists who might interpret observed anemia as indicator of poor nutrition could avert high mortalities attributed in part to adequate diets and chemical toxicities in aquatic biodiversity. Aquatic ecosystems that run through agricultural or industrial areas have high probability of being contaminated by run off and ground water reaching the variety of chemicals and produce adverse effects on fish and aquatic fauna.

Blood is a reddish colored specialized connective tissue body fluid in every living organisms. In vertebrates, the main functions of blood are transport of oxygen and carbon dioxide, transport of nitrogenous waste and transport essential nutrients etc. Chandra et al. (2001) showed toxic effect of carbofuran on hematological parameters in *Cyprinus carpio*. Blood components includes, a liquid portion is called plasma and cellular portion that is called blood cells. It is a circulatory body fluid and circulates throughout the body of vertebrates. Fish blood acts as a medium for the translocation of chemicals, the medium to different organs or system of an animal (Krishna and Govil, 2004). In aquatic animals, the route of chemicals entry is through gills or mouth, so into blood and subsequently to different organs or body systems. Hence the impact of the toxic metals can be well understood by analyzing either blood or serum. Hematological studies have long been considered as a valuable diagnostic tool in clinical biochemistry, genetics and in medical anthropology APHA, AWWA, WPCF (1976).

Materials and Methods:-

The present work was carried out at the laboratory of department of zoology, Yeshwant Mahavidyalaya, Nanded.(M.S), India. The fish, *Clarias batrachus* with average length of 17-20 cm and weight of 160-190 gm. were procured from local fish markets of Nanded. The fishes were brought to laboratory and were kept in the glass aquarium to observe any visible pathological symptoms. The fishes were firstly washed by tap water in aquarium of research laboratory. The fishes were bathed in 0.1% potassium permanganate solution and acclimatized under laboratory condition for two days. They were kept in large glass aquarium of 100 liters

capacity. During acclimatization period water was changed daily. The fishes were fed of earthworm pieces and rice on alternate days.

A stock solution of aluminum sulfate were prepared in laboratory after acclimatization, fishes were transferred to next glass aquarium, and the physico-chemical properties of test water were studied as per APHA (1998). They were divided into two groups. Each group contains 10 fishes in normal and treated group. The fishes were exposed to aluminum sulfate for 24 hrs. 48hrs, 72 hrs, and 96 hrs. Blood parameters analyzed in both normal and treated groups and then the treated groups compared with normal group.

Collection of blood:-

The blood was collected by cutting caudal peduncle using a sharp knife for hematological studies and also more blood collected from hepatic vein through syringe.

Table-1-Levels of blood parameters in *Clariasbatrachus* exposed by aluminum sulfate

Sr. No.	Blood parameters	Control	24 hrs.	48 hrs.	72 hrs.	96 hrs.
1.	R. B. C. Count 1×10^6 mm^3	2.45+0.40	2.31+0.06	2.26+0.05	2.15+0.07	2.10+0.04
2.	W.B.C. Count 1×10^3 mm^3	4.15+0.09	4.09+0.05	3.85+0.06	3.78+0.07	3.69+0.04

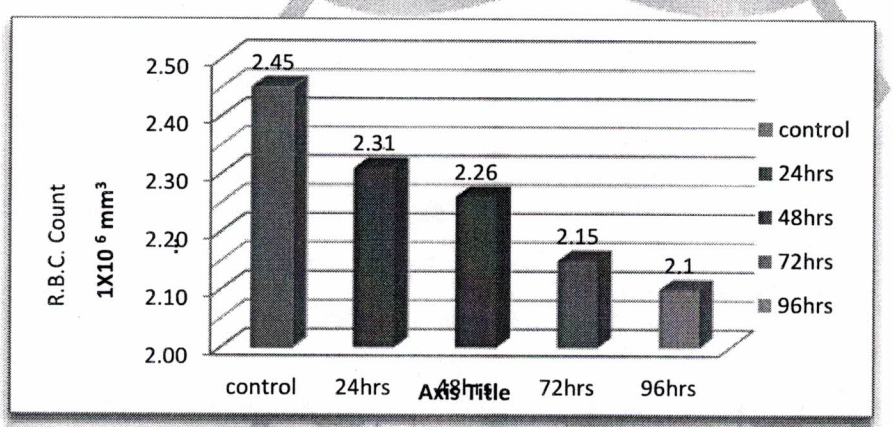

Fig.1-Effect of aluminum sulfate on R.B.C. count of *Clariasbatrachus*

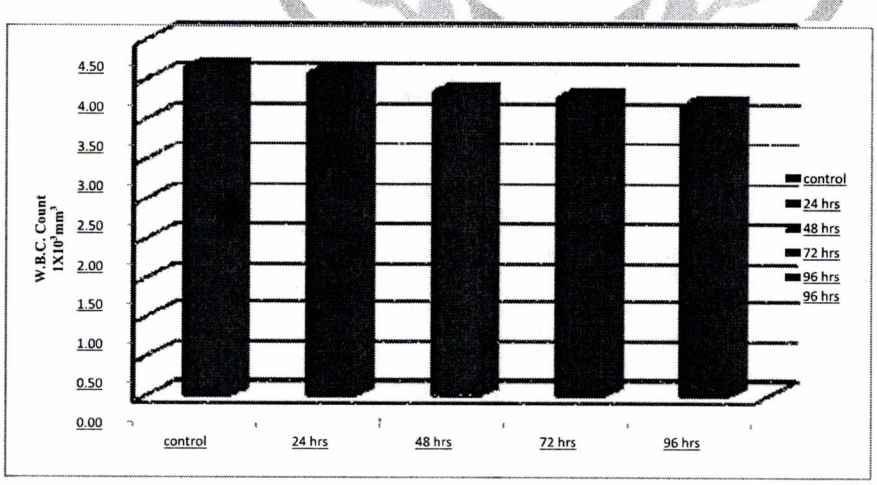

Fig. 2 – Effect of aluminum sulfate on W.B.C.countof *Clariasbatrachus.*

Result: -

In this investigation erythrocytesvalues were determined using different concentration of aluminum sulfate for different exposure time period using 10 fishes. The haematological values for 24 hrs. were highest followed by 48 hrs, 72 hrs and 96 hrs. for aluminum

sulfate recorded as 2.31 ppm for 24 hrs., 2.26 ppm for 48 hrs., 2.15 ppm for 72 hrs. and 2.10 ppm for 96 hrs.The another blood cells includes leucocytes values determined at different time period using 10 fishes for aluminum sulfate recorded as 4.09ppm for 24 hrs.,3.85ppm for 48 hos.,3.78 ppm for 72 hrs. and 3.69ppm for 96 hrs.

The determination of values is great significance, since it provides fundamental data for the design of more complex model. The haematological values were recorded for the determination of healthness of experimented fishes and effect of body exposed by chemical. The fishes *Clarias batrachus* exposed to aluminum sulfate showed decreases erythrocytes and leucocytes values with time duration increases.

Discussion:-

Any alteration in aquatic animal due to stress, infection or pollution affects the physiological, biochemical and behavioral activities of the living animals. The selected chemical was aluminum sulfate for the toxicological study on fresh water fish *Clarias batrachus*. The aluminum sulfate shows adverse effect on aquatic organisms. It showed decreases in erythrocyte count and leucocytes count of *Clarias batrachus.* Reduction in R.B.C. values were reported up to 96 hours, transport of oxygen is done by the presence of hemoglobin in erythrocytes. Exchange of oxygen and carbon dioxide is one of the important functions of RBCs. The oxygen supply in the tissues and oxygen demand of the tissues both appear to be the fundamental mechanism for the regulation section of erythropoietin, values of red blood cells and haemoglobin content were decreased. In present study, the decrease in R.B.C. count during acute treatment might have resulted from severe anemic state of heamolysing due to the toxic effect of aluminum sulfate (Krishna and Govil,2004).

Similar observation made by many authors,Vinodhini and Narayan (2009) observed the impact of toxic heavy metals on the hematological parameters in common carp (*Cyprinus carpio*) (Singare et al.,2011).The another obseverVutukuru (2005) showed acute effect of hexavalent chromium on survival and hematological parameters of the Indian major carp. A failure in red blood cells production and or due to increase in the erythrocyte destruction leads to reduction in R.B.Cs. Shobha Rani (1987) showed decreasing trend of total R.B.C. with increasing concentration and exposure time to monocrotophos on *Anabas testudineus* (Bloch).The decrease in Hb and R.B.Cs. number by the fenvalrate impact was attributed to symptoms leading to hypochromic microcytic anemia which is ascertained to iron deficiency and a consequent reduction in hemoglobin (Tilak and Satyavardhan,2002). In present investigation Hb content decreased during 24, 48, 72 and 96 hours in fish *Clarias batrachus* exposed by aluminum sulfate.

The aluminum sulfate.showed alters in physiology and survival of aquatic animal under metabolic stress. This change in physiology and metabolic process depend upon the type of chemicals and species of animals observed by (Singare et al. 2011). The determination of toxicity is necessary for safe and identification of toxic level for each and every aquatic organisms.

Conclusion:- It is concluded that as per observation the concentrations and levels of aluminum sulfate determination is necessary to freshwater fishes.

References: -

1. **Stephenson T. (1987):-** Sources of heavy metals in wastewater. Heavy metal in wastewater and sludge treatment. Sources Analysis and Legislation. JN Lester (ed). 1; 13-64, CRC Press, Cleveland. DH.
2. **Turkmen M. Turkmen A, Tape Y, Tore y,(2009) :-** Determination of metals in fish species from Aegean and Mediterranean seas, Foodchem. 113(1):233-237.
3. **Prashanth, M.S., David, M., Mathed, S.C.(2005):-** Behavioral changes in freshwater fish *Cirrhinus mrigala* (Hamilton) exposed to cypermethrin J. Environ. Biol. 26(1); 141-144
4. **Chandra S. Ram R.N., Singh I.J. (2001):-** Toxic effect of carbofuran on certain hematological parameters in yearlings of *Cyprinus carpio*. Aquaculture. 2 : 237-140.
5. **Krishna A.K. and Govil P.K. (2004**):- Heavy metal contamination of soil around Pali industrial area Rajasthan India Environmental Geology 38-44.
6. **APHA, AWWA, WPCF (1976):-** Standard methods for the examination of water.14thEdn, American public Health Association. Washington, USA.
7. **APHA/AWWA/WPCF (1998):-** Standard method for the examination of water and waste water, 20th ed. Am. Public Health Assoc., New York.
8. **Vinodhini R and Narayan M. (2009):-** The impact of toxic heavy metals on the heamatological parameters in commoncarp (*cyprinus carpio*) Iran.J. Environ Health.Sci.Eng.6(1).23-38
9. **Vutukuru S.S. (2005):-** Acute effects of hexavalent chromium on survival, oxygen consumption, Hematological profiles of the Indian major carp, *Labeo rohita*. Int.J. Environ. Res Public Health, 2456-462
10. **Shobha Rani, V.S.(1987) :-** Effect of dichlovos (DDVP) on certain blood parameters of the teleost *Chlarias batrachus*.Indian J.Anim.Physiol.5(1):18-21.
11. **Tilak, K. S., K. SatyaVardhan (2002) :-** Effect of fenvalerate on oxygen consumption and hematological parameters in the fish *Clarias batrachus* (Bloch). J. aquatic. Biol.17; 81-86.
12. **Singare P.U. Lokhande, R.S. and Jagtap, A.G., (2011):-** Water pollution by discharge effluents from govt. Industrial area of Maharashtra, India; Dispersion off Heavy metals and their toxic effects, International .J. of Global Environmental Issue ,11(1),28-36 Toxicol Apl. Pharmacol. 198(2); 209-230.