



# Haemoglobin Is Influenced By Aluminum Sulfate In Freshwater Catfish *Clarias batrachus*

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## ABSTRACT

Fishes are the main biotic components of any aquatic ecosystem hence they are selected for toxicological study. Heavy metals adversely affect many non-target species (Tilak and Satvardhan, 2002, Prashanth et al., 2005). The fishes are the main supply of cheap and healthy protein to a large percentage of the world's population.

The use of aluminum sulphate in industrial sectors disinfectant and antiseptic in medicines as an intermediate in production of other compounds. These chemicals cause the adverse effect on aquatic ecosystem has gained increasing attention in recent duration. The effect of the chemicals may be physiological, biochemical and pathological in nature (Stephenson, 1987). The changes produced by 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 high mortalities attributed in part to adequate diets and metal toxicities in aquatic biodiversity.

**Keywords:**-Haemoglobin, Aluminum sulfate, *Clarias batrachus*.

## 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 anaemia 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 redish coloured specialized connective tissue body fluid in every living organisms. In vertebrates, the main functions of Hb are transport of oxygen and carbon dioxide (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 permagnate 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.



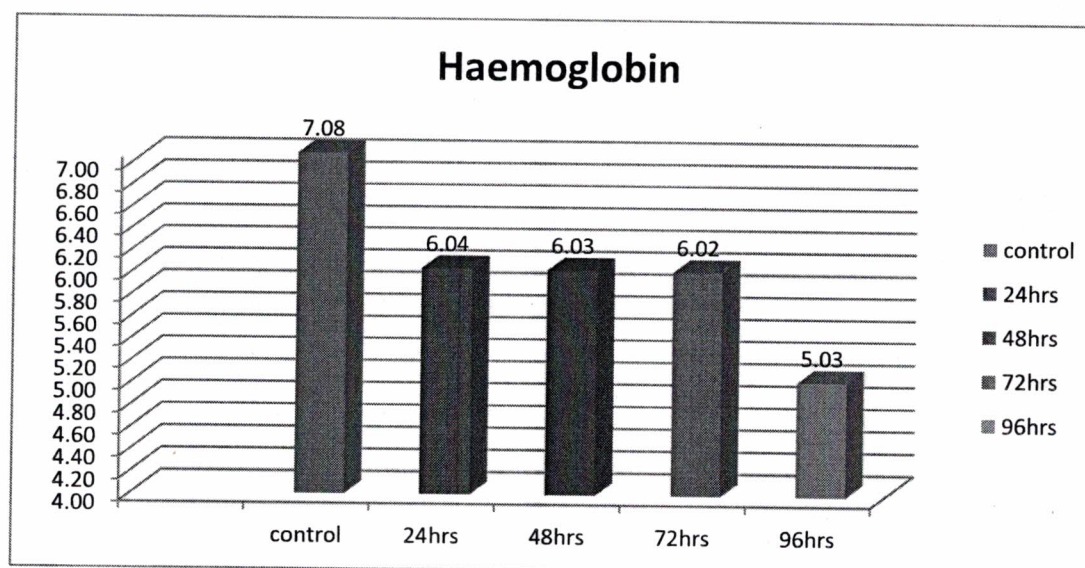
A stock solution of aluminum sulfate were prepared in laboratory after acclimatization, fishes were transferred to next glass aquarium, and the physico-chemical properties of test water were studied as per APHA (1998). They were divided into two groups. Each group contains 10 fishes in normal and experimented group. The fishes were exposed to aluminum sulfate for 24 hrs, 48hrs, 72hrs, and 96 hrs. Blood parameters include hemoglobin 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 haemoglobin in *Clarias batrachus* exposed by aluminum sulfate

Serial No.	Blood parameters	Control	24hrs	48hrs	72hrs	96hrs
1	Hemoglobin gm./dl	7.08±0.05	6.04±0.36	6.03±0.32	6.02±0.36	5.03±0.36



Exposure period in hours

Fig.1. – Effect of aluminum sulfate on haemoglobin of *Clarias batrachus*.

#### Result: -

In this investigation haemoglobin values were recorded using different concentration of aluminum sulfate for different exposure time period using 10 fishes. The haemoglobin values for 24 hrs. were highest followed by 48 hrs, 72 hrs and 96 hrs. for aluminum sulfate recorded as 6.04 ppm for 24 hrs., 6.03 ppm for 48 hrs., 6.02 ppm for 72 hrs. and 5.03 ppm for 96 hrs.

The determination of values is great significance, since it provides fundamental data for the design of more complex model. The haemoglobin 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 haemoglobin values with time period 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 haematological study on fresh water fish *Clarias batrachus*. The aluminum sulfate showed adverse effect on aquatic organisms. It showed decreases in (Hb) count of *Clarias batrachus*. Reduction in haemoglobin 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 haemoglobin. 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 haemoglobin content was decreased. In recent study, the decrease in haemoglobin count during acute treatment might have resulted from severe anemic state of heamolysing due to the effect of aluminum sulfate (Romic and Romic, 2003).

Some observations made by many authors, Vinodhini and Narayan (2009) found that the impact of toxic heavy metals on the hematological parameters in common carp (*Cyprinus carpio*) (Singare et al., 2011). The another observer Vutukuru (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 chloride 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).

#### Conclusion:-

It is concluded that the aluminum sulfate influence decreased haemoglobin level in freshwater fish *clarias batrachus*.

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