



Study on the Physico-chemical Changes Induced by Lead Nitrate in Certain Organs of a Fresh Water Fish: *Saccobranchus Fossils*

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ORIGINAL ARTICLE



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ABSTRACT

The present work includes the physico-chemical analysis of water after the treatment with Lead Nitrate. Much contrasting changes have been observed in the different parameters, in contrast with the control. Dissolved Oxygen value decreases showing respiratory distress. Free CO₂ shows gradual increase along with Nitride values, which shows gradual decrease and gradual increase with Chloride values, and further shows gradual decrease. Lead Nitrate does not show appreciable changes in pH of the water. Total hardness also shows a decreasing trend. All these findings indicate that Oxygen decrease and stress results in the damage of the structure of the gill and increase in opercular beats.

KEY WORDS

Water, Oxygen, Fossils, Pollution.

Water pollution is a serious threat to the quality of our environment, water pollutants can endanger aquatic life. Indiscriminate use of heavy metals, pesticides is causing serious threat to aquatic fauna, and every year millions of fishes are reported to be killed by sewage, toxic chemicals, and industrial wastes. Toxic chemicals exert toxic effects on the fish by changing physical and chemical environment and water quality of conditions and these in turn effect aquatic life by reacting with the mucus on gill surface, causing coagulation and thus resulting in respiratory distress. The present investigation is therefore aimed to study the physico-chemical condition of test and control water due to Lead Nitrate in certain organs of fish *Saccobranchus fossils*.

Review of Literature

Many studies have received the position/status of pollution including freshwater streams and rivers by heavy metals in India. The contamination of aquatic environment by heavy metals, which has caused much lethal effect on the fish and fisheries. Various researchers have highlighted the toxic effect of heavy metals-lead nitrate, Cu, Hg, etc. on the physico-chemical condition of the water.

Mcleod et, al. (1973) observed that toxicity tolerance of fishes decreases with increase in temperature, and fish becomes less tolerant in tropical condition of water.

Mauch (1977) found that hardness, and water temperature did not affect the biological activities of fishes, while pH shows changes when fishes were exposed to carbonate, hexa-carbonate, in the present study no remarkable changes were noticed in temperature of water, by author.

Dawson et,al. (1977) found that temperature and hardness have effect on the toxicity, but the toxicity was much increased in water with low pH. While in the present study Lead Nitrate toxicity increases with decreasing hardness. This indicates that the hardness of water also effects the fishes.

Cairns. et, al. (1973) observed that pH of water increases due to change in concentration of Carbonate and bi-carbonate ions. Dawson et.al. (1977) observed that toxicity increases in water due to low pH.

James R (1990) found that sublethal effect of heavy metals- Cd, Cu, Zn etc. on behaviour and respiratory response and then reported that oxygen concentration and opercular movements were increased when the fishes were exposed to metal individually or in combinations or in combination, while it declined on 15th day of experiment. Similar finds have been observed by the author due to lead nitrate exposure of *Mystus gulio*.

Materials and Methods

Saccobranthus fossilis was selected as test fish because of convenient size and availability throughout the Year. Fishes of equal size and weight were collected and transferred to a big size aquarium filled with water.

Standard methods were followed to analyze experimental and control water for different parameters, given in the observations.

Observations

Disolved Oxygen

Physico-chemical observations in control and recovery range; in *Saccobranthus fossilis* - Dissolved Oxygen: In control the value ranges between 7.0 -8.9 mg/l, while at 15 mg/l of Lead Nitrate ($Pb(NO_3)_2$), it ranges 3.2 mg/l – 8.2 mg/l. In the control water dissolved oxygen (D.O.) value increase gradually during the experimental period. *Saccobranthus fossilis* shows a high range of dissolved oxygen (D.O.) at both concentrations indicating less effect of toxicity and reduced oxygen consumption. Therefore, Lead Nitrate causes oxygen depletion, resulting in respiratory problems of air breathing fish.

Free Carbon-Di-Oxide CO_2

The free Carbon-Dioxide depends upon the dissolved oxygen. The free Carbon-Di-Oxide values in control ranges between 4.02 mg/l to 10.15 mg/l, while in 20 mg/l it ranges from 2.0 mg/l to 9.0 mg/l. In control water the free Carbon-Di-Oxide value remained high in the beginning of the experiment and decreased at the end of the experiment, while in treated water, more oxygen consumption and high degree of toxic stress.

Hydrogen ion-concentration

In control range the value of pH ranges from 6.0 to 7.0 mg/l, while in 15 mg/l, the value ranges from 6.2 to 7.5 mg/l; while in 20 mg/l, the value ranges from 6.0 to 7.0 mg/l. It is observed that the pH concentration is more in water with lead nitrate and less in control water. It shows that lead nitrate does not

make appreciable change in pH of water, while there is slight increase in hydrogen ion concentration with increase in concentration.

Total Alkalinity

Alkalinity of water is significant for biological activities. *Saccobranthus* fossils shows total alkalinity in the range of 40-65 mg/l of calcium carbonate. The values of total alkalinity in control range between 160-180 mg/l, but in 15 mg/l concentration to value ranges between 150 mg/l - 165 mg/l, while in 20 mg/l concentration the values range between 154 mg/l -164 mg/l. This indicates that alkalinity slightly increased in heavy metals. Due to lead nitrate toxicity the alkalinity slightly decreases, while in control it was slightly higher.

Total Hardness

The values of total hardness in water ranges between 185-187 mg/l. In case of control, it is observed that value of total hardness increases in the beginning but in the middle of experiment decreases and at the end of the experiment increases again.

CONCLUSION

Many studies have received the position/status pollution including fresh water streams and rivers by heavy metals in India. The contamination of aquatic environment by fish and fisheries. Various researchers have high lighted the toxic effect of heavy metals -lead nitrate , CU, Hg, ect on the physico chemical condition of water. "Sublethal effect of heavy metals-Cd, Cu, Zn etc on behaviour and respiratory response and than reported the oxygen consumption and opercular movements were increased when the fishes were exposed metal individually or in combination, while it declined on experiment. Similar findings have been observed due to lead nitrate exposure of *Mystus Gulio*.

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