

Histological Effect of Aluminum Sulphate on Heart And Gills of Freshwater Catfish, *Clarias Batrachus*

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Abstract

In aquatic animals particularly fishes gills are supply organ of blood to the heart. In the research work we observed the knowledge and adverse effects of man-made activities about industrialization in the world. Industrial effluent containing heavy metals dissolve and reach to water body, cause damage to tissue and finally death of aquatic animals. Cardiovascular system is one of the important systems for each and every living organism. Industrial effluents from industrial area may easily find their way into the natural water surfaces and adversely affect the quality of water surfaces and creates hazards for aquatic life resulting in serious damage to non-target species, including fishes, crabs etc. (Agarwal S.K 1991., Ashraj, W. 2005, Delgado et al, 2006, Hassan B.K. 2011, Guentzel, et al., 2001, Harris et al., 2003, Sapnarani Charak et al., 2014, Selvanathan et al., 2013).

Key words:- Aluminum sulphate, *Clarias batrachus*, Heart.

Introduction:-

Use of recently developed chemicals and industrial wastes are well known for the adverse effects on the aquatic organisms. The toxicity of metal generally affects the central nervous system and extending towards the stress on physiological and pathological status of the fish. This pathological stress and status can be determined by the estimation of biochemical effects. This change in pathological form causes the increase in the consumption of the chemicals in the body of fish finally which leads to imbalance in the natural status of fish.

In aquatic animals particularly in fishes, gills are supply organ of blood to the heart. Water born toxic contaminants damages initially to gills and then to heart of fishes. Saroja (1959) literature review found that in aquatic ecosystem when contaminated by toxic pollutants it relates with the concentration of pollutants to which that much attention has not given. In the present study focus was given on heart of fish through consumption rate of *Clarias batrachus* when exposed to aluminum sulphate with time period of 24hrs, 48hrs, 72hrs, and 96hrs.

Materials and methods:-

Same sized (180-200gm) healthy freshwater fishes *Clarias batrachus* test fishes were collected from the fisher man, Nanded. Fishes were washed

with 0.1% of potassium permanganate (KMnO_4) solution to avoid dermal infection. They were then rinsed in water and acclimatized to the laboratory conditions for two weeks in 100L capacity glass aquarium. If mortality occurred during this period, dead fish were removed immediately with the fear that such mortality may deplete dissolved oxygen with resultant effect on other fish. During acclimatization fishes were fed with pieces of live earthworm and rice on alternate days. Water in the aquaria was also changed once in every day.

For studying histopathology of the various tissues, 10 fishes from treated groups were exposed to sub lethal concentration of aluminum sulphate (0.6ppm) up to four days. Control group were also maintained separately. After 96 hours fishes were removed from both group and immediately stunned with a blow on the head body of heart were dissected out and fixed for 24 hr. in aqueous Bouin's fixative. Material was thoroughly washed in running tap water till yellow colour of picric acid went off. The material was then dehydrated in different grades of alcohol, cleaned in xylene and paraffin blocks were prepared. Paraffin sections cut at 6 μm thicknesses with help of microtome machine. Ribbon of sections was taken on slides and excessive wax was removed by heating slide on lamp. Sections were stained with hematoxyline and Eosin and mounted in DPX.

Stained sections of all tissues were observed under microscope and photographed.

Fig:1(Control) Photomicrograph of V.S.of Heart of fish *Clarias batrachus*(CMF-Cardiac Muscle)

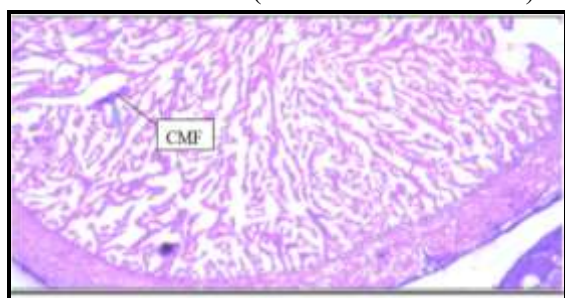


Fig: Control slide of Heart of *Clarias batrachus*

Fig-2 (ASH) Photomicrograph of V.S. of Heart of fish *Clarias batrachus* at 96 hrs.(VD-Vacuolar Degeneration, CM –Cardiac Muscle)

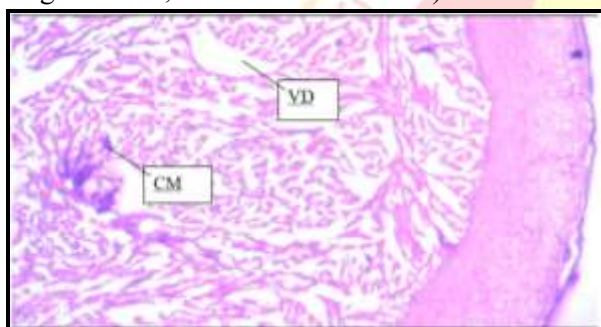


Fig: Experimental slide of Heart of *Clarias batrachus*

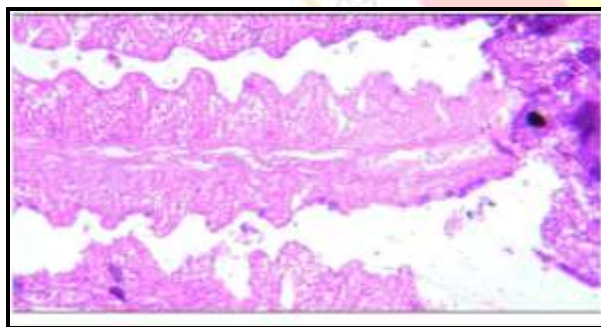


Fig-3. (Control) Photomicrograph of T.S. of Gill of *Clarias batrachus* at 24 hours.(GL- Gill lamellae)

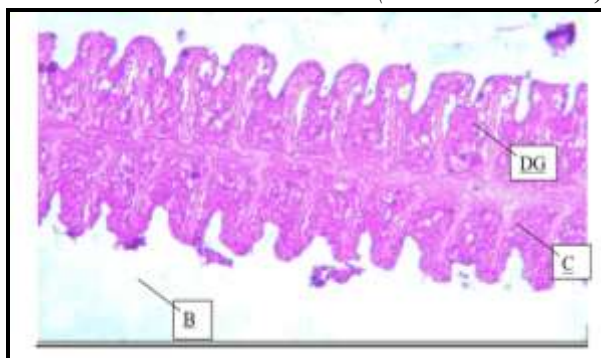


Fig-4.Photomicrograph of T.S. of Gill of *Clarias batrachus* at 96 Hours (BC-Blood Congestion; DGL-

Degeneration Gill lamellae; CN-Cellular Necrosis)(ASG)

Result: -

In the present investigation, the histopathological changes induced by concentration of aluminum sulphate on heart and gills of *Clarias batrachus* were studied.

Gills are an important organ because of its direct contact with water and any effect of agency has to go through it to come into the fish body. It has been suggested that water born agencies damage fish gills, presumably by causing brake down by the gas exchange mechanism with the consequent tissue hypoxic conditions the micro photograph of gill and heart is the another essential organ of body.

Clarias batrachus has been observed in control fish the structure of gill and heart is similar to that of other fresh water cat fishes whereas the gills and heart of the experimental fish exposed to aluminum sulphate for 4 days show active secretion of mucous. In aluminum sulphate treated fishes showed damaged gill and heart and blood congestion observed as compare to normal fish.

Result: -

In the present investigation, the histopathological changes induced by concentration of aluminum sulphate in heart of *Clarias batrachus* were studied.

Heart is an important organ of fish body.It has been suggested that water born agencies damage fish body, presumably by causing brake down by the gas exchange mechanism with the consequent tissue hypoxic conditions the micro photograph of gill then pass to heart of *Clarias batrachus* has been observed. In control fish the structure of heart is similar to that of other fresh water cat fishes whereas the heart of the experimental fish exposed to aluminum sulphate for 4 days show active secretion of mucous. In aluminum sulphate treated fishes showed damaged cardiac muscles and cellular necrosis and blood congestion observed as compare to normal fish.

Discussion:-

Aluminum sulphate cause pollution and it brings histopathological alterations in different tissues of fish. Histopathology deals with the study of histological structure of the tissues. The study of tissues of fish may help to identify the actual cause of death and its causative agents. Aluminum sulphate accumulates in different tissues of body and produce

toxic effects of abnormalities at tissue level. Present investigation showed that aluminum sulphate at lethal concentration has serious effect on histology of heart (Agarwal et al.,2000). In present investigation significant alteration in structure of heart has been observed. Slide -1 show normal structure of heart in fresh water fish *Clarias batrachus*. Several histological alterations were seen in the heart of *Clarias batrachus* under lethal treatment of aluminum sulphate. The number of workers reported that there is adverse effect of heavy metals on histology and metabolism of aquatic animals. Similar changes were also observed by Malla Reddy, (1988) Balaji,(1991) Chinnayya, (1971) Nagabhushanam and Diwan (1972).

The histological changes on fish is a noteworthy and promising field to understand the extent to which changes in the structural organization are occurring in the organs due to environmental pollution.

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