Toxicological study of freshwater catfish, *clarias batrachus* uncovered by mercuric chloride

B.S. Kamble[1], P.S. Bele[2] ,A.S Munde[3]

[1]Department of Zoology, Maharashtra Udayagiri Mahavidyalaya,Udgir, Maharashtra, India

[2]Department of Zoology, Arts, Commerce and Science college, Gangakhed, Maharashtra, India

[3]Department of Zoology , Sambhajirao Kendre Mahavidyalaya,Jalkot,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 of mercuric chloride in agricultural sectors as fungicide, disinfectant and antiseptic in medicines as an intermediate in production of other mercury compounds. These 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.

In agriculture land the excess use of herbicide and pesticide are the main source of water pollution in the modern age. They are related to the mismanagement of industrial wastes.LC_{50} value is the concentration at which 50 % kill of the exposed animals within a given time periods .The LC_{50} values were determined by graphical probit analysis for 24, 48, 72 and 96 hours' time periods.

Keywords:- Mercuric chloride, Clarias batrachus, Toxicity evaluation.

Introduction:-

In aquatic toxicology the traditional LC_{50} test are used to measure potential risk of a pollutant. Krishna and Govil (2004) studied heavy metal contamination of soil around Pali industrial area.Industrial effluents contain highly toxic chemicals like heavy metals that cause aquatic pollution including rivers, lakes, ponds and ditches etc._Mohammad Reza (2012) showed LC_{50} and bio concentration of mercury chloride in freshwater fish.Toxicity is a relative property of a chemical which refers to its potential to have a harmful effect on a living organism. It is a function of the concentration of the chemical and duration of exposure, if toxicity and related data are commonly used in comparing chemical. J. Selvanathan, 2011, showed determination of median tolerance limit of *Clarias batrachus* for cadmium chloride and mercuric chloride.

The accumulations and persistence of pesticides on the aquatic environment constitute a threat to living life as witnessed by the chronic and acute poisoning of fish and other aquatic ecosystem. (Guedenon P. et. al., 2012) The science of toxicology has progressively made from being an activity based on the ability to observe and classify the harmful effects of chemicals in the animal body, relying principally on the tools of classical pathology to achieve these ends, to a discipline explain the effects of toxic compounds. This change has resulted from the wide spread application of techniques and concepts from a wide range of basic sciences, triggered by the realization of the potential impact of exposure to a wide range of chemicals on human health.

Materials and Methods:-

Freshwater fishes *Clarias batrachus* (magur) were collected from the fisher man,nanded for experimentation. The collected fishes were acclimatized in laboratory aquarium for five days. Fishes were divided into different sets and each set contain ten fishes. Only healthy fishes ranging between 180-200gms in weight were selected for the work. Aquariums were disinfected by applying 1% KMnO4 solution to avoid any dermal infection.

The stock solution of mercuric chloride was prepared by dissolving 1gm in 100 ml distilled water. From the stock solutions different concentrations of solutions were prepared. In toxicity bioassay test, groups of test animals were exposed to wide range of chemical concentration. Different sets of fishes were exposed separately to gradually increasing concentrations of mercuric chloride. The mortality rate was recorded after every 24hr., 48hr., 72,and 96 hrs.A control set was maintained with similar number of animals and chemical free tap water. In treated set the water changed at every 24 hours along with toxicant to maintain concentration of chemical.

The dead animals were removed quickly from the aquarium water.The mortality was noted for each concentration at 24 , 48, 72 and 96hr of exposure period.Each experiment was repeated thrice and results were recorded.

The percentage mortality values were converted to probit values which then plotted in the graph against log of respective concentration. Some pilot tests were carried out for the selection of test concentration the static method was used to run the experiment of toxicity evaluation upon 96hr as described by Finney (1971).

Table 2.3 Toxicity evaluation after exposure to mercuric chloride at different hours

Conc. in ppm	Log of ppm	Exposure time in hr. (Mortality)			
		24hr	48hr	72hr	96hr
0.15	0.1761	-	-	-	3.72
0.20	0.03010	-	-	3.72	4.16
0.25	.03979	-	3.72	4.16	4.48
0.30	.04771	3.72	4.16	4.48	5.00
0.35	.05441	4.16	4.48	5.00	5.25
0.40	.06021	4.48	5.00	5.25	5.52
0.45	.06532	5.00	5.25	5.52	5.84
0.50	.06990	5.25	5.52	5.84	5.84

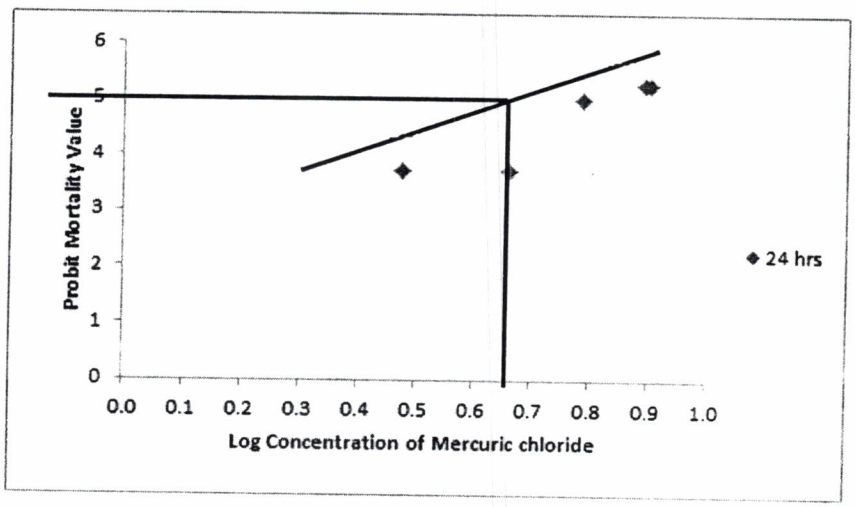

Fig:-2.5 : LC_{50} Value of *Clarias batrachus* exposed by Mercury chloride for 24hrs.

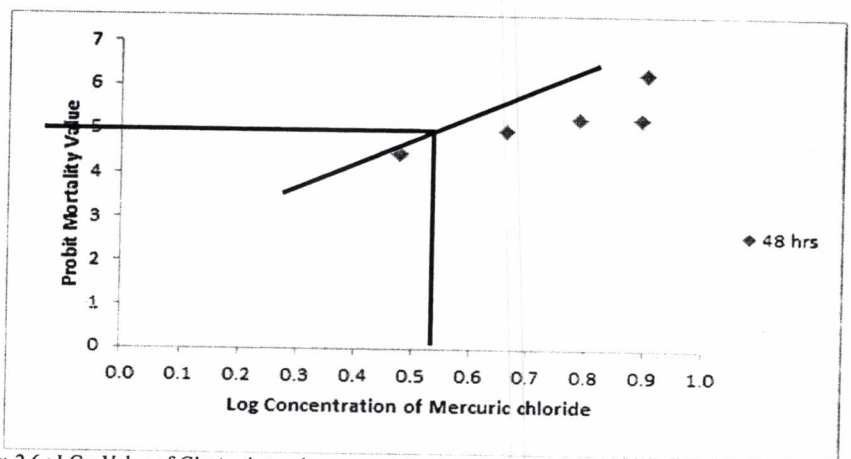

Fig:-2.6 : LC_{50} Value of *Clarias batrachus* exposed by Mercury chloride for 48hrs.

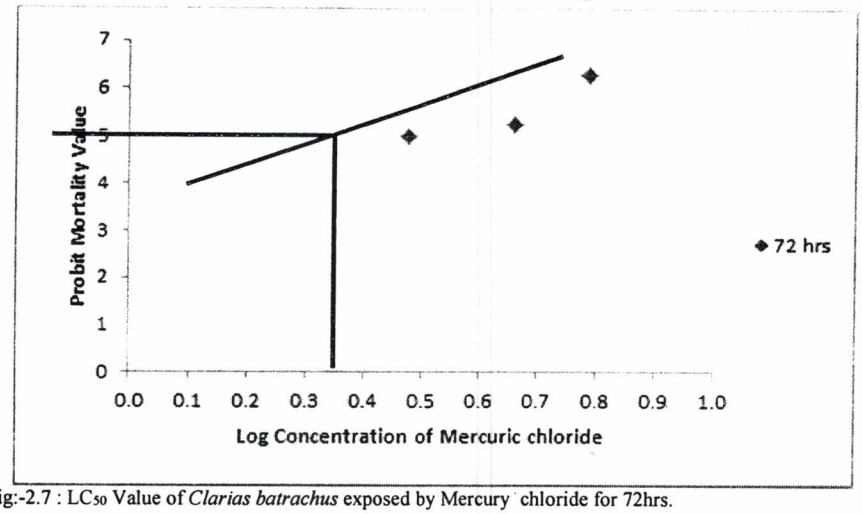

Fig:-2.7 : LC_{50} Value of *Clarias batrachus* exposed by Mercury chloride for 72hrs.

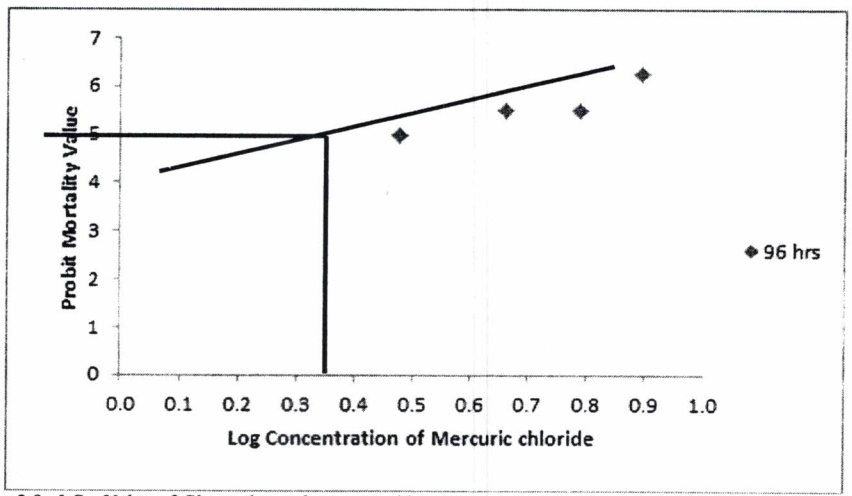

Fig:-2.8 : LC_{50} Value of *Clarias batrachus* exposed by Mercury chloride for 96hrs.

Result: -

In present investigation LC_{50} values were determined using different concentration of mercuric chloride for different exposure time period using 10 fishes.LC_{50} values for 24 hrs. were highest followed by 48 hrs, 72 hrs and 96 hrs. for mercuric chloride recorded as 0.45 ppm for 24 hrs., 0.40 ppm for 48 hrs., 0.35 ppm for 72 hrs. and 0.30 ppm for 96 hrs.

The determination of LC_{50} values is great significance, since it provides fundamental data for the design of more complex model.The LC_{50} values were calculated by probit analysis (Finney, 1971). The fishes *Clarias batrachus* exposed to mercuric chloride showed an inverse relation with time duration and concentration of chemical.

It was clear that from above table the concentration and time duration increased with rate of mortality also increased. It means that mortality was directly proportional to the concentration of test solution and duration of exposed.

Discussion:-

The present investigation showed that the toxicological study after exposure to mercuric chloride on freshwater catfish *Clarias batrachus.* Heavy metals are the main water pollutants of every aquatic ecosystem in the world (Landis et al.,2002).Use of contaminated water is potential risks to humans and other living life and to form unwanted side effects to the environments (Yang and Rose,2003). Toxicity tests are used to determine the level of toxicants which are harmful for every living organism. (Slabbert. J. I. and Venter G.A., 1999, Ward G.S. and Parrish P.R.1982).

The LC50 value increases with increasing concentration of mercuric chloride.The LC50 values are directly proportional to the concentration of toxicants. The aquatic organisms survive under toxic conditions but this is not favorable conditions for their better and normal survival of life. Toxicants to make the water become toxic and disturb to the normal life of aquatic organisms