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Impact of Lethal and Sub Lethal Concentration of Copper Sulphate on the Behavior of Freshwater Fish *Channa punctatus*

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Abstract:

Copper (Cu) exists in a variety of forms in different aquatic environments, and affects their bioavailability. Copper (Cu) is a plentiful element found in the Earth's crust. It has been reported that the Cu existing in natural environments ranged from 0.2 to 30 µg/L in freshwater, and 0.03 to 0.23 µg/L in surface seawater. Copper is an essential element in many biological processes, but may exert toxic effects on fish life. Present investigation deals with the effect of metallic pollutant (copper sulphate) on behavior of freshwater fish Channa punctatus. Test animals were exposed to different concentration of copper sulphate i.e. B batch fishes exposed to lethal concentration of copper sulphate (LC 50 1.450 ppm) and C batch fishes where exposure to sub lethal concentration of copper sulphate (LC 50 0.145 ppm) Present study reveals that test animals are very sensitive and showed many changes in their normal behavior.

Keywords: *Copper sulphate, Behavioral observation, Channa punctatus.*

Introduction:

Behavior is usually a complicated phenomenon through which the animal is capable of adjusting and adapting to the various changes in terrestrial as well as aquatic environment. The behavioral response has often been used as the sensitive measures of stress syndrome in organism expert experiencing it (Eisler,R.,1979.; Miller,D.C.1980.)
The study of behavior beings with observations of an animal movement and other activities. It is a common observation that the same stimulus given to the same animal at different times does not always evoke the same response. Some behavior workers refuse to use them and concentrate entirely on directly observable aspects of behavior. In present work, the study of behavior is essential for comparing the natural and polluted environmental habits of freshwater Channa punctatus.

Material and Method :

The fresh water fish Channa punctatus were collected from Pimpri dam near Udgir, district Latur. Fishes were brought to the laboratory and maintained in glass aquarium container having sufficient amount of fresh water. The fishes were fed with pieces of earthworms. The water of glass aquarium was changed daily. The other conditions were kept constant to their minimum range. The fishes were acclimatized to the laboratory conditions for two weeks before used for the experiments. Medium sized fishes Channa punctatus more or less of same size and weight were selected for experimental purpose.

Healthy fish stored in 3 batches of 10 fishes in each A, B and C batch. A batch was considered as control, where the fish did not exposed to heavy metal, while other 2 batches fish were exposed to different concentrations of copper sulphate (LC50 1.450 ppm) and C batch fishes were exposed to sub lethal concentration of copper sulphate (LC50 0.145 ppm).

During the experimentation fishes were starved and test medium was maintained by changing the old one with fresh medium after every 24 hours. The control batch A was always normal but on the visual observation on the behavioral response of fish exposed to lethal and sub lethal concentration of copper sulphate were made up to 96 hours. To study the behavioral changes in channa punctatus experiments were conducted in a laboratory where there was no disturbances to the aquaria and following activities wear considered. Response to

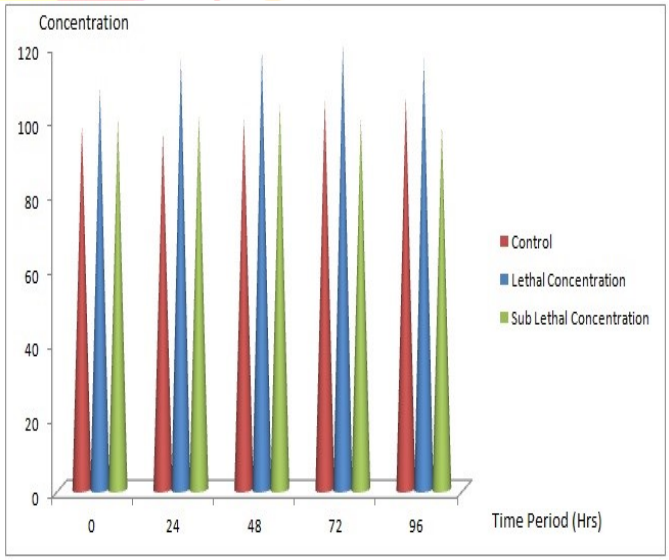
pollutant , activity of mouth, position and locomotion, balance equilibrium and coordination and operculum movements.

Table 1. Behavioral observations made during lethal and sub lethal concentration of copper sulphate on Channa punctatus.

Sr.No.	Observation	Activity of Fish	
		Lethal Conc.	Sub Lethal Conc.
1	Response to Pollutant	Quick excitation move out of aquaria.	Less excited try to avoid toxicant
2	Activity of Mouth	Quick and continuous movement of jaws	Normal movement of jaws
3	Position and Locomotion	Normal position, abnormal locomotion, jerky movement,	Swim normally and settle down in to bottom of aquaria
4	Balance Equilibrium and co-ordination	Total loss of co-ordination Sluggish fish	Fish becomes Sluggish
5	Skin Colour	Darker	No change
6	Operculum Movement	Opercular movement increased with exposure period	Opercular movement slightly increased with exposure period

Table 2. Opercular movement at lethal and sub lethal concentration of copper sulphate.

Sr.No.	Exposed Period	No.of Fish Exposed	Opercular Movement /Min		
			Control	Experimental	
				Lethal Conc.	Sub Lethal Conc.
1	00 Hrs	10	98	108	100
2	24 Hrs	10	96	116	101
3	48 Hrs	10	100	118	104
4	72 Hrs	10	105	120	100
5	96 Hrs	10	106	116	98



Result and discussion :

In the present investigation fish Channa punctatus under normal condition frequently found to increasing opercular movement when fish where exposed to lethal concentration of copper sulphate opercular movement incresed at 0 -2 hours of exposure with increasing concentration.It is generally recognized that fish respond to toxic chemicals by increased opercular movements.Bengeri and Patil(1982) reported increased opercular movements in Barbus aurius and Lepidocephalichthys quntea,exposed to copper,mercury and zinc.

It can be concluded from the present study that opercular movement is concentration dependent and time dependent.Similarly Nagendran and shakuntala (1979) observed that undar the exposure of sublethal concentration of sodium pentachlorophynol Punctus

ticto exhibited significant increase in opercular movement during surfacing activity.Incresed opercular movement can be explained as an immediate response of fish to the suddenly changed the environment and difficulty in aquatic respiration might have induced to increase opercular movement after 24 hours might be because of increased aquatic respiration which can be explained by investigating effects of copper sulphate on aquatic respiration of the fish.

The exposed fish exhibited rapid swimming movements in initial stage and finally led to loss of equilibrium(A.Shweta and B.B.Hosetti,2009). The opercular movements initially included but after 96 hours it declared due to damage of gills (table number 2).Choudhary et. al (1981) reported that H. fossillis exhibited decreased opercular movement in surfacing allow and surfacing prevented conditions with the increasing concentration of malathion. Sudan exposure of fish to lethal and sub lethal concentration of copper sulphate affected the behavioral parameters. They are assayed general morphological behavior which includes response against pollutants ;body movements, position of fish in aquarium body coloration and Opercular movements are changes during exposure period.

Present study reveals that the freshwater fish Channa punctatus showed quick response to lethal and sub lethal concentration of copper sulphate. Test animals becomes excited, erratic, uneasy, tried to escape from the aquaria. The behavioral observations in the present study in the fish can be taken as useful parameter in formulating safe concentration levels of copper sulphate to fish, to ensure proper safety of fish and other aquatic organisms.

References:

1. Eisler,R.(1979): Behavioral responses of marine poikilotherm to pollutants phill Trans,R.Soc.(Ser B)286,PP 507-521.
2. Miller,D.C.(1980): Some application of locomoter response in pollution effects measurement Repp.P.V. Re.Un.Const.Inf.Explor.Met.179:154-161.
3. Bengeri,K.V.and patil,H.S.(1982): Behavioral responses of freshwater fishes Barbus Qurilus and lepidocephalichthys thermallis.Proc.Symp.Physiol Resp.Animal pollutants.
4. Nagendran,R.and Shakuntala R.(1979): Studies on toxicity of biocides to cyprinid forage fishes; part I effects of sublethal concentration of sodium pentachlorophenate on the eco physiology of Punctus ticto (cham)Indian J.exp.Biol.17:270-273.
5. A.Shwetha and B.B.Hosetti(2009): Acute effect of zinc cyanide on the behavior and oxygen consumption of the indian major carp Cirrhina mrigala(Hamilton).World journal of zoology 4(3):238-246.
6. Choudhary B.P.,Pandey P.K. and Dubey N.K.(1981): Effect of melatine on the behaviour and body can composition of Heteropnustus fossilis.J.Environ.Biol.2 (1):21-36.