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Impact of cadmium on The Behavior of Fresh water catfish, Heteropnuestus fossilis

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ABSTRACT

Present study was aimed to observe the behavioral changes due to Hg (0.1mg/l) toxicity in the freshwater catfish Heteropneustes fossilis (Bloch). The fishes exhibited erratic swimming, thick mucus secretion over body surface, skin soars and jerky movements. Fishes tried to leap out of aquarium during experiments. Freshwater catfish, Heteropneustes fossilis were subjected to evaluate toxic impact of cadmium on fish behavior. The exposed animals showed avoidance, increased irritation, frequent surfacing, restlessness, fast opercular beat, irregular movement, loss of balance.

KEYWORDS:

Mercury, Recovery, Toxicity, Heavy Metal, H. *fossilis,* Behaviour.

INTRODUCTION

The aquatic life of water resources is in danger due to industrial pollutants, domestic, agricultural wastes, heavy metals, etc. Numerous studies confirmed that pollutants are adversely affecting the aquaculture (Opaluwa et al., 2012; Haloi et al., 2013). The presence of pesticides and various toxic metal accumulations were observed and reported in the freshwater and marine fish organs (Agrahari S and Gopal K, 2007; Karthigayani et al., 2014). It is well-known that Mercury is a highly toxic non-essential heavy metal. In the modern age its application is increasing in industries and agriculture. It gets accumulated and damages the fish organs. The higher concentrations of Hg damage the organs and intern the fish behavior.

Any changes in fish behavior are considered as one of the sensitive biomarker to evaluate the exposure to the toxicant (Reddy et al., 2011). It had been observed that the fish behavior alters due to the toxicants like heavy metals, pesticides, etc. (Ghanbahadur, et al., 2015 and Deshmukh, 2016). Erratic swimming, escaping from toxic water, mucus secretion, convulsions and food intake, etc. can be considered as some common parameters to measure the changes in fish behavior.

MATERIALS AND METHODS

The fresh water fish H. fossilis was procured from the local water body of Utter Pradesh. The fishes were acclimatized to laboratory conditions in glass aquaria for seven days. Stock solution of HgCl2 was prepared as per the guidelines of APHA (1975). The experimental concentration of HgCl2 was kept at 0.1 mg/l. The food and drug were fed at the rate of 30 and 10 mg/day/fish, with few drops of liquid paraffin, to the fishes of all aquaria respectively. On every fourth day water of all aquaria was changed and fresh metal solution was added to experimental groups.

The acclimatized fishes were divided into groups of 25 each as under:
Group I - Control fed on normal food
Group II - Treated with HgCl2 (0.1 mg /l) and fed on normal food
Group III - Treated with HgCl2 (0.1 mg/l) and fed on food containing drug (Hg + drug)

The fishes of these groups were observed daily. The behavioral changes in all the groups were compared with the control group fishes. Fishes from groups I, II and III were observed for 30 days.

RESULTS AND DISCUSSION

The fresh water fish H. fossilis exposed to HgCl2 showed changes in its normal behavior. The fishes of group II, exhibited a change in swimming pattern. During initial exposure, fishes showed jerky movements with rapid and erratic swimming. They exhibited tendency of escaping from the aquarium. On prolonged Mercury exposure the fishes became sluggish and showed uncoordinated swimming patterns. The similar results were observed in recent past (Sabullah et al., 2015; Sehar et al. 2014). This may be due to the toxic Hg interference in some of the functions which were controlled by the nervous system of the fishes (Daoust 1981; Thangam and Manju, 2013). In group III (Hg + drug) the jerky movements and erratic swimming were reduced.

An excessive mucus secretion over the body surface was observed in the prolonged Hg exposed fishes. This can be attributed to the increased stress due to toxic effect of Hg and caused changes in the area and number of mucus glands (Akhter and Noori, 2014). The excessive secretion of mucus changed the colour of aquaria water to milky white. Like other toxicants the mercury toxicity also caused reduction in food intake in the fishes. The food was not fully consumed in metal exposed fishes as against the control group. It was observed that the food intake was slightly higher in group III (Hg + Liv52) as compared to the group II (Hg exposed) fishes. This suggested that Hg caused loss of appetite and the Liv52 helped to maintain the normal food intake. Liv52 had been reported to increase food consumption in laboratory animals (Reddy et al., 1990; Palas et al., 2014). The findings of this investigation revealed that the intoxication of Hg caused uncoord inated swimming activity, excess mucus secretion and also decreased food consumption in H. fossilis. This may be due to the damage to nervous system by Hg intoxication.

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