

Behavioral Changes in *Clarias Batrachus* Due to Fluoridicated Toothpaste

Abstract

A small project was carried out on behavioral alteration in *Clarias batrachus* due to toothpaste which contained fluoride as one of the content. The behavioral changes in feeding, swimming movement, body orientation, opercular activity, gulping activity, mucus secretion and body coloration were observed.

Keyword: Behavioral Changes, Opercular Activity and Gulping Activity.

Introduction

We all use tooth paste in our daily life as they provide us healthy teeth but their environmental properties are not well known. How they affect animals of aquatic system? How far their ingredients are harmful to aquatic fauna? Can the concentration of ingredient of toothpaste which we consider as at safe level in toothpaste, alter the behavior of aquatic fauna like fish? The main aim of the present study was to find out that what kind of behavioral stress the ingredients of toothpaste can cause to fish.

Methodology

The fresh water cat fish *Clarias batrachus* were acclimatized in tap water for twenty days. The average temperature and pH of the aquarium water was 34⁰ C and 7.6 respectively. Fish were exposed to toothpaste containing fluoride (924 ppm) dissolved in 100 ml water. Each day only ten ml of solution was added to aquarium containing twenty liters of water at the interval of twenty four hours till ten days. A control group was also maintained.

Observation, Result and Discussion

Abnormal behavioral changes like fast feeding activity, jumpy and erratic swimming movement, surface to bottom movement, surfacing activity, restlessness, loss of equilibrium, increased gulping and opercular activity were observed.

The exposed fish were more active and restless compared to control group (V.Venkata Rathnamma and Nagaraju 2014). The control fish were calm and quiet. Exposed fish were found most of the time in the column of water (Narwaria and Saxena 2012) whereas control fish preferred to confine themselves to the bottom of the aquarium. The control fish swam horizontally and slowly as compared to exposed fish that swam in a slanting manner from lower to upper level. Sometimes jumping movement out of the water was also observed (V.Venkata Rathnamma and Nagaraju 2014). The exposed fish went through a period of violent movement then movement in circle which degraded into aimless wandering with poor equilibrium. They preferred that corner of the test chamber where the aerator was fixed. Such type of behavior can be regarded as the avoidance or adaptive behavior of fish to the toxicant.

Food intake was faster in exposed fish. The opercular movement and gulping activity was greater in exposed fish than control fish (Narwaria and Saxena 2012). However this increase was significant only during early doses (first two days) but later on decreased and the differences was less conspicuous. The opercular movement, gulping activity and surfacing behavior was started increasing near about half an hour after the exposure and near about three to four hours later these behavior started normalizing.

The average increase in opercular movement was 26/minute in experimental fish as compared to 21/minute in control group. These observations suggest that fish were initially under great stress that subsided with time possibly due to counteracting effect of enzymatic action especially acid phosphatase (K.P. Sharma et.al. 2012). The stressful and erratic behavior in experiment indicates respiratory impairment probably due to tooth paste on gills. It also indicates the environmental deterioration.

Usha Sahu

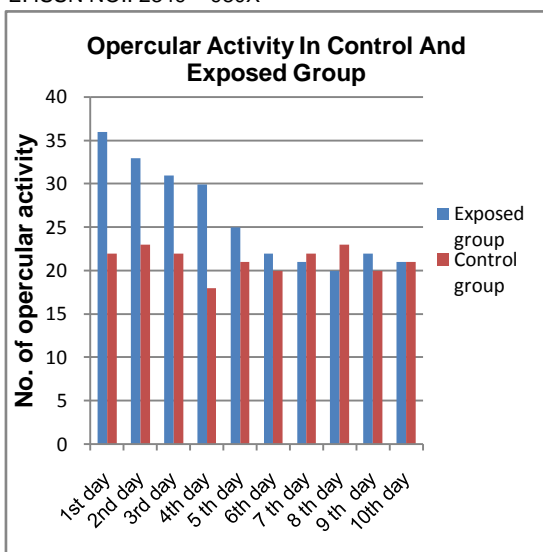
Assistant Professor,
Department of Zoology,
Govt.V.Y.T. P.G. Auto.College,
Durg, Chhattisgarh.

Kanti Choubey

Assistant Professor,
Department of Zoology,
Govt.V.Y.T. P.G. Auto.College,
Durg, Chhattisgarh.

Gangadhar

M.Sc. Student 4th Sem.
Department of Zoology,
Govt.V.Y.T. P.G. Auto.College,
Durg, Chhattisgarh.



Days	Exposed group	Control group
1 st day	36	22
2 nd day	33	23
3 rd day	31	22
4 th day	30	18
5 th day	25	21
6 th day	22	20
7 th day	21	22
8 th day	20	23
9 th day	22	20
10 th day	21	21
Average	26	21

Table: Gulping Activity in fish

Gulping of air may help to avoid contact to toxic medium. Surfacing and gulping activity is probably for demand of higher oxygen level during the exposure period.

Increased mucus secretion was observed (V.Venkata Rathnamma and Nagaraju 2014). The accumulation and increased secretion of mucus in exposed fish may be an adaptive and protective response to avoid the absorption of the applied toxicant by the overall body surface.

Color of the skin changed from normal dark pigmentation to relatively lighter color on the dorsal and lateral part after sixth day of exposure (Farha Aziz et.al. 2013). Alteration in skin pigmentation was probably due to the change in the structure and distribution of chromatophores (Sandeep Bajpai and Madhu Tripathi 2012).

The main ingredients of the toothpaste were fluoride, sodium silicate and calcium carbonates and sodium lauryl sulphate besides the binding gums. Among these ingredients the calcium carbonate is the most commonly used substance in aquaculture. They do not cause any serious environmental

problem (Claude et. al. 1999). Sodium silicate is not harmful to fish It can be a good alternative to liming (Teien et.al. 2006). However sodium lauryl sulphate is reported to cause labored breathing diarrhea and death in animals. (Ammerican college of toxicology 1983). Thus it can be concluded that the behavioral changes observed during the experiment is mainly due to fluoride contents present in the toothpaste.

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