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Research Paper

Analysis of Opercular Movement in Honey Gourami Colisa Chuna And Blue Gourami Trichopterus Sumatranus Upon Exposure to Paracetamol

Zoology

KEYWORDS : Opercular movement, Honey Gourami, Blue Gourami, Paracetamol.

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ABSTRACT

Fishes are very sensitive to changes in surrounding environmental conditions and they come under stress. Opercular beat rate has been used to provide a measure of response to stress in fishes. Various studies have revealed that either the opercular beat rate increases or decreases upon exposure of fishes to toxic compounds. In the present research study the analysis of opercular movement in Honey Gourami Colisa chuna and Blue Gourami Trichopterus sumatranus upon exposure to Paracetamol is being done. Upon periodic exposure to 50 mg of Paracetamol every 30 mins have shown slight decrement in the opercular movement initially but after few hours the opercular movement of both the species have increased and came to nearby normalcy. From the above results it can be concluded that paracetamol does not have much deleterious effects on the opercular movement of Honey Gourami Colisa chuna and Blue Gourami Trichopterus sumatranus. This may be due to sturdiness and high level of adaptability to changing conditions as seen in Gouramis. Also the Gouramis are labyrinth fish as they have a special organ, known as the labyrinth, which allows the fish to breathe air from the surface of the water. The labyrinth organ must be assisting the Gouramis to tackle the physico – chemical changes in the water.

Introduction

Today Pharmaceuticals are emerging environmental contaminants since they are being extensively used in human and veterinary medicine. When these pharmaceuticals are directly or indirectly introduced into any aquatic body then they cause potential effects on the aquatic flora and fauna. (Karl Fent et. al. 2006)

The Pharmaceutical toxicants bring about physiological and behavioral changes in fishes. Fishes are very sensitive to changes in surrounding environmental conditions and they come under stress. Opercular beat rate has been used to provide a measure of response to stress in fishes. Various studies have revealed that either the opercular beat rate increases or decreases upon exposure of fishes to toxic compounds. In the present research study the analysis of opercular movement in Honey Gourami *Colisa chuna* and Blue Gourami *Trichopterus sumatranus* upon exposure to Paracetamol is being done. (A. K. Gibson 2006)

Paracetamol, scientifically known as Acetamide, N-(4-hydroxyphenyl)-, 4'-hydroxyacetanilide is white crystalline powder, completely odourless and having a pH 6.5. Paracetamol belongs to a group of medicines known as analgesics, or painkillers. It is used to relieve mild-to-moderate pain. It is also useful for lowering a raised temperature (fever). Paracetamol is also used to treat many conditions such as headache, muscle aches, arthritis, backache, toothaches, colds, and fevers. It relieves pain in mild arthritis but has no effect on the underlying inflammation and swelling of the joint. Paracetamol is toxic to aquatic life if introduced in any water body. It has a long lasting effects and accumulation is being observed in aquatic organisms. The LC 50 value of Paracetamol in Fathead minnow (*Pimephales promelas*) is 814 mg/l, 96 hours. (U.S. Pharmacopeial Convention)

Gouramis are freshwater perciform fishes belonging to family Osphronemidae. Gouramis are found in freshwater bodies all over Asia, to Malay Archipelago and north-easterly towards Korea. About 90 species of Gouramis have been recognized till date and placed in four subfamilies and 15 genera. Gouramis are being used as experimental model for this experiment because of their easy availability, high level of adaptability to laboratory conditions and its universal acceptance as an research organism. The gouramis are highly sensitive and ethologically responsive to physico – chemical changes in the aquatic environment and hence in the present research the effect on its opercular movement, if Paracetamol gets introduced into the water body is being studied. (V. K. Dey 2014)

Materials & Methods

Honey Gourami *Colisa chuna* and Blue Gourami *Trichopterus sumatranus* were obtained from a local aquarium and brought to the laboratory. It was kept in a tank containing 5 litres of water for 4 days for acclimatization. During this period they were provided micropellets twice a day as food. Twelve hours before the commencement of the experiment the feeding was stopped. Paracetamol tablet of 500mg was dissolved in 200ml of distilled water and for proper dispersion of Paracetamol, the solution was continuously stirred with magnetic stirrer for 24 hours before the commencement of the experiment. During the experiment initial reading was taken without addition of Paracetamol and the opercular movement i.e. opening and closing of operculum was counted. Then after every 30 mins 20ml of the Paracetamol solution was added to the tank and the opercular movement was counted. Every reading was taken in triplicate and its average was considered.

Result

Table 1 Opercular movement readings of Honey Gourami *Colisa chuna* and Blue Gourami *Trichopterus sumatranus* upon exposure to Paracetamol.

Time Interval in Minutes	Conc. of Paracetamol exposed in mg	Average opercular movement per minute	
		Honey Gourami *Colisa chuna*	Blue Gourami *Trichopterus sumatranus*
0 (Initial)	0	81	72
30	50	72	59
60	100	49	72
90	150	70	60
120	200	88	42
150	250	82	42
180	300	57	59
210	350	80	57
240	400	84	80
270	450	80	85
300	500	82	75
Minimum		49	42
Maximum		88	85
Mean		75	64
Standard Deviation		12.11	14.24

p = 0.0632, All the statistical calculations are done using software *Primer of Biostatistics.*

Conclusion and Discussion

The present research study clearly shows that the initial evaluation of average opercular movement per minute in Honey Gourami *Colisa chuna* and Blue Gourami *Trichopterus sumatranus* is 81 and 72 respectively without exposure to Paracetamol.

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Upon periodic exposure to 50 mg of Paracetamol every 30 mins have shown slight decrement in the opercular movement initially but after few hours the opercular movement of both the species have increased and came to nearby normalcy. (Table 1)

From the above results it can be concluded that paracetamol does not have much deleterious effects on the opercular movement of Honey Gourami *Colisa chuna* and Blue Gourami *Trichopterus sumatranus*. This may be due to sturdiness and high level of adaptability to changing conditions as seen in Gouramis. Also the Gouramis are labyrinth fish as they have a special organ, known as the labyrinth, which allows the fish to breathe air from the surface of the water. The labyrinth organ must be assisting the Gouramis to tackle the physico – chemical changes in the water. Similar kind of studies related to opercular movement have been carried out where Jansen & Greene (1970) saw a sudden and pronounced increase in opercular movements when goldfish Carassius auratus (L.) were agitated by an electrical current. Opercular beat rate also increased substantially following noxious injections (Sneddon et al., 2003) or exposure to toxic compounds such as copper (James et al., 2003). Thus opercular movement will always be used as a measure of response to stress in fishes.

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