RESEARCH ARTICLE

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Studies on Tolerance Limit in Major Fishes of Chambal River at Dholpur District

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ABSTRACT

Potentially harmful substances-e.g. pesticides, heavy metals and hydrocarbons-are often released into the aquatic environment. When large quantities of pollutants are released there may be an immediate impact as measured by large-scale sudden mortalities of aquatic organisms, e.g. fish kills resulting from contamination of waterways with agricultural pesticides. Lower levels of discharge may result in an accumulation of the pollutants in aquatic organisms. The end results, which may occur long after the pollutants have passed through the environment, include immunosuppression, reduced metabolism, and damage to gills and epithelia. Tolerance limit or survival efficiency has been taken into consideration in present investigation.
***Key words**: Tolerance limit, Major carps, Dholpur dist*rict

INTRODUCTION

Fish and other aquatic animals are subject to a broad variety of stressors because their homeostatic mechanisms are highly dependent on prevailing conditions in their immediate surroundings. Yet few studies have addressed stress as a potential confounding factor for bioassays that use fish as test subjects. Common stressors encountered by captive fish include physical and mental trauma associated with capture, transport, handling, and crowding; malnutrition; variations in water temperature, oxygen, and salinity; and peripheral effects of contaminant exposure or infectious disease. Some stress responses are detectable through gross or microscopic examination of various organs or tissues; as reported in the literature, stress responses are most consistently observed in the gills, liver, skin, and components of the urogenital tract. In addition to presenting examples of various stressors and corresponding morphologic effects, this review highlights certain challenges of evaluating stress in fish: (1) stress is an amorphous term that does not have a consistently applied defi nition; (2) procedures used to determine or measure stress can be inherently stressful; (3) interactions between stressors and stress responses are highly complex; and (4) morphologically, stress responses are often diffi cult to distinguish from tissue damage or compensatory adaptations induced specifi cally by the stressor.

However, the link between adverse water quality and fish diseases is not proven. Alleged pollution-related diseases include epidermal papilloma, fin/tail rot, gill disease, hyperplasia, liver damage, neoplasia and ulceration. Many surveys have indicated a greater proportion of diseased fish in polluted compared to non-polluted marine sites. Yet, the value of such surveys may be questioned. Specific examples of fish diseases thought to reflect the effects of pollution include surface lesions attributed to Serratia plymuthica, fin and tail rot caused by Aeromonas hydrophila and Pseudomonas fluorescens, gill disease resulting from the actvity of Flavobacterium spp., vibriosis as caused by Vibrio anguillarum, and enteric redmouth (causal agent, Yersinia ruckeri). Research indicated that some of the diseases caused by Aeromonas, Flavobacterium and Pseudomonas resulted from generally adverse water quality, i.e. higher than usual quantities of organic material, oxygen depletion, changes in pH values and enhanced microbial populations. Some infections with Serratia and Yersina may well have reflected contamination of waterways with domestic sewage, e.g. leaking septic tanks. At least one outbreak of vibriosis was linked to high concentrations of copper, which may have debilitated the fish making them more susceptible to disease.

MATERIALS AND METHODS

(Collection of fishes from Chambol river at Dholpur)

Water pollution especially in river Dholpur, which receives domestic and industrial effluents either directly or indirectly, the following parameters have been selected for details investigation. Temperature, pH and D. O.

The main features of the present investigation are as follows-

1. Collection of fishes from river Chambol at Dholpur and their acclimatization in laboratory condition.
2. Effect of temperature, pH and D. O. on survival time/tolerance limit of fishes.

RESULTS AND DISCUSSION

Tolerance limit

(A) Effect of temperature on survival period for *Catla catla*

All the fishes were alive up to 37^{0}C of cutla-cutla. After 37^{0}C they started dying at different time intervals. In 40^{0}C all fishes died in 4-6 hours.

Effect of temperature on survival period for *Labeo calbasu*

In case of Labeo-calbasu all the fishes were alive up to 35^{0}C after 35^{0}C they started dying at different time intervals. In 43^{0}C all fishes died in 4-6 hours.

(B) Effect of pH on survival period for *Catla catla*

All the fishes were alive upto 11.0 pH after 20 days in case of cutla-cutla. After 11.0 pH they started dying after different time intervals. In 12.0 pH all fishes died in 9-11 hours.

Effect of pH on survival period for *Labeo calbasu*

All the fishes were alive upto 10.5 pH after 25 days in case of Labeo-calbasu. After 10.5 pH they started dying after different time intervals. In 13.0 pH all fishes died in 9-11 hours.

(C) Effect of D.O. on survival period for *Catla catla*

All the fishes were alive up to 3.0 to 3.5 ppm after 25 days. In case of cutla-cutla below 2.5 ppm they started dying after different time intervals. In 1.5 ppm all fishes died in 3-7 hours.

Effect of D.O. on survival period for *Labeo calbasu*

All the fishes were alive up to 3.0 to 3.5 ppm in case of Labeo-calbasu below 2.5 ppm they started dying after different time intervals. In 2.0 ppm all fishes died in 3-7 hours.

The tolerance limits of Labeo-calbasu and Catla-catla in different parameters.

Table 1: Tolerance limits for different parameters

Fish name	Tolerance limit		
	Temperature	pH	Dissolved oxygen
Labeo-calbasu	38^{0}C	11.0	3.5 to 4.0 ppm
Catla-autla	35^{0}C	10.5	3.5 to 4.0 ppm

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