



ORIGINAL ARTICLE

Studies on Physiological Changes in *Catla catla* in Chambal River at Dholpur District

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ABSTRACT

Fish physiology is the scientific study of how the component parts of fish function together in the living fish. It can be contrasted with fish anatomy, which is the study of the form or morphology of fishes. In practice, fish anatomy and physiology complement each other, the former dealing with the structure of a fish, its organs or component parts and how they are put together, such as might be observed on the dissecting table or under the microscope, and the later dealing with how those components function together in the living fish. In the view of importance of fish physiology, the effect of polluted water of Chambal river has been observed on physiological stress in fishes.

Key words: *Catla catla, Physiological changes, Chambal river, Dholpur district*

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INTRODUCTION

Physiological methods, previously used as health indicators in laboratory investigations on fish exposed to toxicants, have been applied to feral fish living in metal-polluted waters. A background to the use of a physiological approach for detecting early-arising effects of toxic chemicals on fish is given, together with a description of the clinical parameters used and their physiological relevance. The results and experiences from the field application show that certain clinical methods may be very useful in detecting and diagnosing sublethal disturbances in natural fish populations in polluted areas. Furthermore, the results indicate a good agreement between metal-induced physiological effects detected in fish exposed under natural field conditions and those found in laboratory experiments. Most fish exchange gases using gills on either side of the pharynx (throat). Gills are tissues which consist of threadlike structures called filaments. These filaments have many functions and "are involved in ion and water transfer as well as oxygen, carbon dioxide, acid and ammonia exchange. Each filament contains a capillary network that provides a large surface area for exchanging oxygen and carbondioxide. Fish exchange gases by pulling oxygen-rich water through their mouths and pumping it over their gills. In some fish, capillary blood flows in the opposite direction to the water, causing countercurrent exchange. The gills push the oxygen-poor water out through openings in the sides of the pharynx. Breathing air is primarily of use to fish that inhabit shallow, seasonally variable waters where the water's oxygen concentration may seasonally decline. Fish dependent solely on dissolved oxygen, such as perch and cichlids, quickly suffocate, while air-breathers survive for much longer, in some cases in water that is little more than wet mud. At the most extreme, some air-breathing fish are able to survive in damp burrows for weeks without water, entering a state of aestivation (summertime hibernation) until water returns.

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. Study of the physiological changes of control and temperature pH and D. O. treated fishes.

RESULTS AND DISCUSSION**CHANGE IN OPERCULUM MOVEMENT FOR *CATLA CATLA* IN TEMPERATURE:**

When the temperature becomes increased then operculum movement were decreased. The fishes were found to survive for more than 20 days in these solutions. In control group of fishes, the breathing rate was normal. The rate of operculum movement reduced 61 per minute when temperature 34°C after 10 days as against 81 per minute in control experiments.

CHANGES IN OPERCULUM-MOVEMENT FOR *CATLA CATLA* IN D.O.:

It is seen that the rate of operculum movement decreases as the D. O. decreases fishes were found to survive for more than 20 days in these solution. In control group of fishes the breathing rate was normal. The rate of operculum movement was reduced in 54 per minute when concentration of D. O. was 3.5 to 4.0 ppm as against 68 per minute in control experiments after 10 days.

CHANGES IN OPERCULUM MOVEMENT FOR *CATLA CATLA* IN pH:

It is seen that the rate of operculum movement decreased as the pH increases. The fishes were found to survive for more than 25 days in these solutions. In control group fishes, the breathing rate was normal. The rate of operculum movement was reduced to 58 per minute when pH was 10.0 after 10 days as against 74 per minute in control experiments. Physiological changes show that the rate of operculum movement decreased as the temperature, pH increased and dissolved oxygen decreased. In control group of fishes breathing rate was normal. While it is reduced in high temperature, pH and low dissolved oxygen treated fishes. In all the fishes investigation the impact of each parameter was interestingly similar, All the two fishes investigated are commonly found in river Chambal of Dholpur Distt. one of the most important for agriculture as well as for industry in India. In each case irrespective of temperature, pH and dissolved oxygen taken for fish under investigation. It was observed that the high temperature, pH and low dissolved oxygen level of water, which cause scarcity of oxygen in water. It is expected that failure of respiratory organs led to the suffocation in fishes and ultimately death. This is also reflected by the fact that the sizes of the fishes do not have any favourable effect on tolerance level of the temperature, pH and dissolved oxygen. There are two possible explanation.

Due to high temperature and low dissolved oxygen scarcity of oxygen is taking. Correlation matrix studies with regard to physical biological parameters further strengthen the view that water quality at down stream site (D) is tremendously deteriorated as compared to up stream site (A) in the present investigation.

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