

## Toxic effect of synthetic pyrethroid on blood component of fishes

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### Abstract

Pollution of water is responsible for a very large number of mortalities and incapacitation in the world. Polluted state of water resources has led to a steady decline of fish population. Pollution to biosphere by insecticide is characterized by presence of water residues in food products, the persistence in natural conditions and their circulation along food chain. The insecticides which are liberated into aquatic ecosystem have a tremendous effect on fish and thereby to man. The present study has been undertaken to investigate the effect of cypermethrin on freshwater edible fishes *Channa orientalis*, *Clarias batrachus* and *Heteropneustes fossilis*, which reveals that the immune system of fishes is very badly affected due to fluctuations in leucocytes count of fishes as the exposure period increases reflecting the immune system of fish to withstand stress.

**Keywords:** fishes, pollutant, leucocytes, stress

### 1. Introduction

Pesticides are spread through all segment of environment <sup>[1]</sup> (Jensen *et al.*, 1969). Pesticides have become a part of the environment as contamination due to their widespread use in agriculture and disease control program. A toxicant induces its effect at cellular or even at molecular level but ultimately cause physiological, pathological and biochemical <sup>[2]</sup> (Yeragi, *et al.*, 2003) changes, the natural physiological functioning of an organisms, get disturbed on exposure to toxicant stress which leads to decline in population of aquatic fauna especially fish which forms the major protein rich diet for rural people. Pyrethroids have very high insecticide activity though they are persistent in environment their acute toxicity to fish is high. The present study deals with comparative variation in leucocytes count due to cypermethrin induced to all three fishes at various exposure periods affecting the immune power by reflecting the resistance to withstand stress. Hence there is a need to conserve such fauna by obstructing the inlets of poisonous toxicants, gases, chemicals and substances which disturb the fragile threads of aquatic ecosystem, thereby causing deleterious effects on the life of human beings.

### 2. Materials and method

For the study, freshwater, edible, air breathing fishes *Channa orientalis* (Sch), *Clarias batrachus* (Linn) and *Heteropneustes fossilis* (Bloch) found in local fresh water ponds and rivers of Daryapur region of (Dist. Amravati) were collected. They were disinfected with 1% KMnO<sub>4</sub> and acclimatized for 15 days. Then after various exploratory tests at 0.001 ppm concentration of cypermethrin, the experimental work at different time intervals was carried out. To evaluate leucocytes count Neubaur Haemocytometer slide and Turks

fluid was used as a WBC diluting fluid. The leucocytes were counted in 4 large corner squares.

The analysis of blood parameters was repeated three times and results were subjected to statistical analysis with students (t) test for significance <sup>[3]</sup> (Baley, 1965) of all three fishes exposed to toxicant at various time intervals.

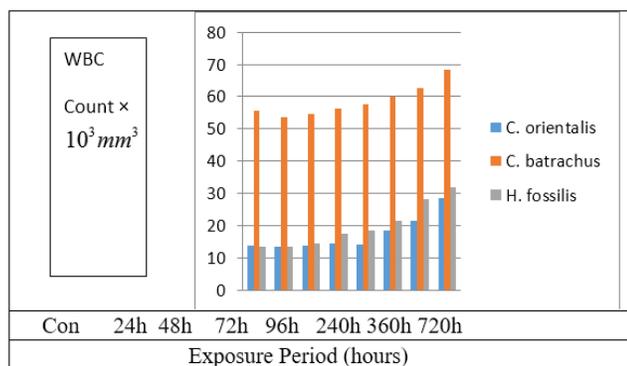
### 3. Result and discussion

The behavior of fishes varied considerably towards toxicant. *C. batrachus* and *H. fossilis* at early hours of exposure period tried to gulp towards surface of water, taking jerky movements which may be to save from coming in contact with water. *C. orientalis* was very sensitive to the toxicant as when it tried to take a jerk 3 - 4 times it used to fall in the damp with a loss of movement and coordination. There was change in color, hypoactive with lethargy till 720 hrs with large secretion of mucous over body surface in *C. orientalis* than that of *C. batrachus* and *H. fossilis*.

The reduction in WBC count in study, at early exposure period in *C. orientalis* and *H. fossilis* upto 24 hrs. of exposure period and upto 48 hrs. in *C. batrachus* and then steady increase in all 3 fishes upto end of experiment (Figure) reveals a probability of response to combat against toxicant stress <sup>[4]</sup> (Adhikari, *et al.*, 2004). Joshi and Harish, 2004, reported decrease in WBC count in *C. batrachus* exposed to fenvalerte as the count increases. The increase in count may be attributed to immunological stress due to pollution <sup>[5]</sup> (Tilak and Satyavardhan, 2002). The reason of decrease in count for short term exposure may be that after insecticide intoxication the RBC/ WBC ratio decrease, <sup>[6]</sup> (Shakoori, *et al.* 1996). The decrease in WBC count is also reported by <sup>[7-8]</sup> Saxena, *et al.*, 2002; Nath and Banerjee, 1960.

Wintrobe <sup>[9]</sup> in 1979, stated that such alterations in TLC and their relative proportion are the measures of the reaction of body to the anxious agents. The occurrence of short term leucopenia <sup>[10]</sup> (Chaudhari, *et.al*; 1998) may be due to hypochromic microsytic anemia and inhibition by phagocytic activity <sup>[11-12]</sup> (Smith *et. al* 1967; Secombs, 1994). Leucocytosis was result of direct stimulation of immunological defenses due to presence of toxic substances or may be associated with the presence of induced tissue damage <sup>[13-14]</sup> (Siddiqui, *et al.* 1991, Ashok kumar, *et al.* 1995).

Thus, it is concluded and inferred that cypermethrin reflects the immune power of all three fishes to withstand stress there by reflecting the physiological status of human beings. The present work reveals that suitable, measures need to be undertaken to prevent leaching of pesticides there by conserving of aquatic fauna with a hope of some service in management of pollution hazard to society.



**Fig:** Total leucocytes count of *C. orientalis*, *C. batrachus* and *H. fossilis* exposed to cypermethrin at different time intervals.

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