EFFECT OF LONG-TERM EXPOSURE TO ENDOSULFAN ON BLOOD CELL COUNT IN *CHANNA GACHUA*

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ABSTRACT

In the present investigation, live specimens of *Channa gachua* were exposed to sublethal concentrations, *i.e.*, 0.0017 and 0.00087 ppm, of endosulfan for a period of 60 days. After the completion of 60 days, red and white blood corpuscles were counted from control as well as experimental fishes.

Keywords: *Channa gachua*, endosulfan, blood cells

INTRODUCTION

Pesticides used in excessive quantities have caused potential health hazards not only to humans but also to all forms of aquatic life. An exposure to pesticides for a considerable length of time is known to adversely affect a number of vital functions. Several attempts have been made to study the effect of pesticides on different parameters of the blood of fishes.

Several workers have studied the effect of pesticides on different haematological parameters of a number of fishes. The study on the haematology of fish has contributed significantly to the understanding of comparative physiology, phylogenetic relationship, mode of animal life, food selection and other significant ecological parameters.

Bhoopathy and Gunasegar (1999) observed changes due to the sublethal concentration of potassium dichomate in the exotic fish *Oreochromis mossambicus* (Trewaves). Srinivas *et al.* (2001) reported the effect of malathion and dichlorovos on *Catla catla*. Chatterjee *et al.* (2005) observed the impact of sodium chloride and cypermethrin in *Channa punctatus* on long-term exposure.

The aim of the present investigation was to study the effect of the pesticide endosulfan on red and white blood corpuscle count in *Channa gachua* for 60 days.

MATERIAL AND METHODS

Healthy specimens of *C. gachua* (11-16 cm) weighing about 25-30 g were collected from Kham River near Aurangabad and brought to the laboratory without any mechanical injury. The fish were maintained in glass aquaria and allowed to acclimatize for one week before being used for the test. Each aquarium was filled with 20 l of water (pH 7.4). The aquaria were marked as I, II and III; the first two served the experimental purpose and the third served as the control. All the fish

were supplied with worms as food during the experiment. In the experimental aquaria, the fish were exposed to 0.0017 and 0.00087 ppm concentrations of endosulfan.

After the completion of 60 days, the blood of fish was collected from the experimental and control aquaria. Red and white blood corpuscles were enumerated using Hayem's solution and WBC diluting fluid on Neubaur's improved double chamber counting slide.

RESULTS AND DISCUSSION

The results show a decrease in red blood corpuscles, while the white blood corpuscles increased when exposed to both the sublethal concentrations of endosulfan when compared to the control group. The results of experimental and control groups are presented in Table 1.

Table 1: Changes in blood cell count in *Channa gachua* exposed for 60 days to endosulfan

Parameter	Control	0.0017 ppm	0.00087 ppm
RBC (no.x10^6/mm^3)	2.27±0.049	2.10±0.063	2.17±0.048
WBC (no./mm^3)	18.85±0.047	21.72±1.353	22.28±0.643

Each value is the mean ± SD of ten observations.

Sharma and Gupta (1982) reported that carbon tetrachloride intoxication induces significant changes in erythrocyte number and differential count of white blood corpuscles in *Clarias batrachus*. The decrease in the number of red blood corpuscles is due to the loss of water from the plasma to the tissue or the haemopoetic organ might be affected which could have reduced the production of red blood corpuscles.

Bhoopathy and Gunasegar (1999) showed that the white blood corpuscles increased in number in the fish exposed to potassium dichromate clearly exhibiting immune system response to the toxicant, while the red blood corpuscle number decreased significantly due to the damage inflicted by the toxicant to the erythroblasts that produce red blood corpuscles and also to the existing red blood corpuscles.

The reduction in erythrocyte count might be caused either by the inhibition of erythropoiesis or by the destruction of red blood cells. Iwama *et al.* (1986) reported that the destruction of haemopoietic tissue in kidney and spleen results in decreased blood cell production and consequent reduction in erythrocyte count. Similar results were observed by Mukhopadhya and Dehadrai (1981), Srinivas *et al.* (2001), and Svoboda *et al.* (2001).

The increase in leukocyte count during the sublethal treatment in the present study may be due to leukocytosis, which is an adaptation to meet stressful condition by the animal. A similar observation was made by Sen *et al.* (1992) and Srinivas *et al.* (2001).

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REFERENCES

Bhoopathy, S. and Gunasegar, N., 1999. Potassium dichromate induced physiological changes at sub-lethal concentration in the exotic fish *Oreochromis mossambicus* (Trewavas). *Proc. Nat. Aad. Sci. India,* **69(B):** 3-4.

Chatterjee, S. K. Ghosal, A. and Ghosh, S., 2005. Impact of sodium chloride and cypermethrin on hepatic and haematological dysfunction in *Channa punctatus* (Bloch) after chronic exposure. *Proc. Zool. Soc. Calcutta,* **58(2):** 105-108.

Iwama, G. K., Greer, G. L. and Randall, D. J., 1986. Changes in selected hematological parameters in juvenile chinook salmon subjected to a bacterial challenge and a toxicant. *J. Fish Biol.,* **28:** 563-572.

Mukhopadhyay, P. K. and Dehadrai, P. V., 1981. Biochemical changes in the air breathing catfish, *Clarias batrachus* (Linn.) exposed to malathion. *Environ. Pollut.,* **22:** 149-158.

Sen, G., Behera, M. K. and Patil, P., 1992. Effect of zinc on haematobiochemical parameters of *Channa punctatus. J. Ecotoxicol. Environ. Monit.,* **21(2):** 89-92.

Sharma, R. C. and Gupta, N., 1982. Carbon tetrachloride induced haematological alteration in *Clarias batrachus. J. Environ. Biol.,* **3(3):** 127-131.

Srinivas, A., Venugopal G., Pisca, R. S. and Waghray, S., 2001. Some aspects of haematobiochemistry of Indian major carp *Catla catla* influenced by malathion and dichlorovos (DDVP). *J. Aqua. Biol.,* **16(2):** 53-56.

Svoboda, M., Luskova, V., Drastichova, J. and Zlabek, V., 2001. The effect of diazinon on haematological indices of common carp *Cyprinus carpio* (L). *Acta. Vet. Barno.,* **70:** 457-465.