

IMPACT OF MALATHION ON SOME HAEMATOLOGICAL PARAMETERS OF *CHANNA PUNCTATUS* (BLOCH)

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Abstract

Malathion is an organophosphorous insecticide widely used in agricultural and non agricultural purposes in India, creates a serious threat to the environment as well as target and non target organisms. The present investigation was undertaken to study the effect of malathion on some haematological parameters of *Channa punctatus*. *Channa punctatus* was treated with malathion and LC₅₀ value for 96 hours was calculated following probit analysis methods. *Channa punctatus* was exposed to sublethal concentration of malathion (0.8 ppm). The study revealed a declining trend of RBC, Haemoglobin and increasing trend of WBC indicated toxic effect of malathion on *Channa punctatus*.

Keywords: Malathion, *Channa punctatus*, Haematological parameters

1. Introduction

The environment is plagued with different kinds of pollutants. Insecticides are one of such pollutants which play an important role in controlling different types of insects that cause damage to the crop plants. Indiscriminate use of insecticides on crops causes serious environmental hazards affecting aquatic and land dwelling animals. Unfortunately, most of the insecticides are not biodegradable and tend to persist for years together in soil and water. There are many reports available related to toxicity of insecticides on different fish species^{11,14,15,20}.

Among these pesticides, organophosphorous compounds are commonly used insecticides. Malathion is commonly used organophosphorous pesticide. While most of the malathion will stay in the areas where it is applied, some can move to areas away from where it was applied by rain, fog and wind. Once malathion is introduced into the environment, it may cause serious intimidation to aquatic organisms and is notorious to cause severe metabolic disturbances in non target species like fish and freshwater mussels.

Haematological parameters have been used to describe the health of fish monitoring stress responses¹⁸ and predict systematic relationship and physiological adaptations of animals. They more quickly reflect the poorer condition of fish than other commonly measured parameters¹

The present study was carried out on some haematological parameters of locally available fresh water fish *Channa punctatus* treated with insecticide malathion.

2. Material and methods

For the present study, commercial grade malathion (50% EC, manufactured by Coromandal fertilizer limited, Coromandal house, pesticide division, Ranipet, Vellore (TN), India) was procured from the local market. Healthy specimens of *Channa punctatus* were collected from local river Godavari Dist. Nanded. Their average length and wet weight (\pm SD) were recorded as 23 ± 2 cm and 80 ± 4 gms respectively. Fishes were treated with 0.1 % KMnO_4 solution for 2 min. to avoid any dermal infection. The fish stock was then maintained in 100 liter glass aquaria for 14 days to acclimatize under laboratory condition. The fishes were fed with pieces of live earth worm on alternate days. A stock solution was prepared in acetone and mixed in water to obtain required dilutions. The LC₅₀ value for 96 hours of malathion was determined by the procedure of Finney (1971). The LC₅₀ of malathion for 96 hours for *Channa punctatus* was 4 mg/liter. Fishes were exposed to sublethal concentration (0.8 ppm) of malathion, simultaneously control group was also maintained. After 96 hours of exposure to insecticides blood was collected from the caudal peduncle of both control and treated groups. The RBC and WBC counts were made by Neubauer hemocytometer. Hemoglobin determination was performed by Sahli's haemometer.

Table -1 Effect of sublethal concentration of malathion on some haematological parameters of *Channa punctatus* at 96 hours exposure.

Parameters	Control	Treated
Total RBC count ($\times 10^6/\text{mm}^3$)	3.68 ± 0.09	$2.13 \pm 0.6^*$
Total WBC count ($\times 10^3/\text{mm}^3$)	60.00 ± 1.04	$81.56 \pm 1.95^*$
Hb gm (%)	10.44 ± 0.17	$7.33 \pm 0.5^*$

Values are mean \pm SEM, n=3,

* = significant at $p < 0.05$ level,

RBC = Red Blood Cells,

WBC = White Blood Cells,

Hb% = Haemoglobin

3. Result

The result of haematological parameter was presented in table-1. The result showed a decreasing trend of RBC from $3.68 \times 10^6/\text{mm}^3$ in control group to $2.13 \times 10^6/\text{mm}^3$ in treated group while the total number of WBC were increased in numbers from $60 \times 10^3/\text{mm}^3$ to $81.56 \times 10^3/\text{mm}^3$. The result showed 10.44 gm (%) hemoglobin content in control group which was reduced to 7.33 gm (%) in the treated group of fishes.

4. Discussion

Blood offers important profile to study the toxicological impact on animal tissues. Different blood parameters are often subjected to change depending upon stress condition and various other environmental factors⁶. The significant decrease in RBC count in the present study might be due to haemolysis and shrinkage of blood cells by the toxic effect of insecticide. Mount¹² observed erythropenia and leucopenia in the fish of Mississippi river induced by the organochlorine insecticide endrin poisoning. Shrivastava¹⁶ observed cellular and nuclear hypertrophy, change in shape, agglutination and bursting of erythrocytes in *C. mrigala* fingerlings treated with urea. Chakrabarty, Chauhan and Singh^{3,4,17} also observed in a similar findings in fish treated with pesticides and chemicals.

In present investigation, a decrease in hemoglobin level was recorded after 96 hours exposure of malathion and *Channa punctatus* (Table 1). The reason may be release of immature cells from haemopoietic tissue into the blood strength as well as disruption of iron

metabolism that lead to a defective hemoglobin synthesis. Similar view has been put forward by many authors^{2,8,13,17,19}.

Increased WBC count established leucocytosis, which is considered to be of an adaptive value for the tissue under chemical stress. This also helps in the removal of cellular debris of necrosed tissue at a faster rate⁹. In the presence of foreign substances or under pathological conditions leucocytosis in fish may be the consequence of direct stimulation of immunological defense⁹. The increase in WBC count can be correlated with an increase in antibody production which helps in survival and recovery of the fish exposed to lindane and malathion⁷.

The results of the present investigation reveal that the entire physiology of fish was affected under stress due to malathion exposure. Malathion induced haematological disturbances followed by metabolic disorders in *Channa punctatus*, which ultimately leads to the deterioration of general health of the fish.

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