DOI:10.33451/florafauna.v23i2pp411-414

FLORA AND FAUNA ISSN 2456-9364 (Online)

2017 Vol. 23 No. 2 PP 411-414 ISSN 0971 - 6920 (Print)

HAEMATOLOGICAL CHANGES IN A FRESH WATER FISH, *CHANNA PUNCTATUS* UNDER CARTRIZ EXPOSURE

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Received **:** 25.07.2017; ***Accepted*** : 18.09.2017

ABSTRACT

Toxic effects of carbamate pesticide cartriz on the haematological characters in a facultative air breathing fish, *Channa punctatus* has been investigated in the present study. The intoxication of pesticide exhibited a significant decrease in RBC count, Haemoglobin concentration, packed cell volume (PCV) and oxygen carrying capacity of blood, whereas a progressive rise in total leucocyte count (TLC) and clotting time was observed in varying period of intoxication, revealing toxic nature of the agro chemical .

Figure : 00 References : 19 Table : 01

KEY WORDS : *Channa punctatue,* Cartriz, Haematological, Parameters, Pesticide

Introduction

Increasing amount of agro-chemicals including pesticides, fertilizer, weedicides and growth regulators are being used now days in developed and developing countries to boost crop-yield. But their extensive and indiscriminate use posses a constant threat to aquatic life particularly fishes, adversely affecting their histophysiology, reproductive biology and haematological profile since they live in close association with their aquatic environment and are sensitive flight fluctuation that may occur within them. In the last more than one decade the effect of pesticides on toxicity and physiological profile especially haematology have been studied by several workers[9,10,11,12,15,17]. But there is paucity of information on the toxicity of pesticides especially cartriz on air breathing fishes. In the present study an attempt has been made to investigate the toxic effect of a carbamate pesticide, cartriz on some haematological characters of fresh water air breathing fish, *Channa punctatus*.

Material and Methods

Live specimens of *Channa punctatus* collected from fresh water ponds, kept in a large aquarium and were washed with 0.1% $KMnO_4$ solution to avoid dermal infection. They were allowed acclimatization to the laboratory condition for a period of fifteen days. The fishes were given easy access of fresh air regularly and allowed feeding on fish food and pieces of goat liver to study the toxic effects of the pesticide on the hematology, the healthy acclimatized fish of almost equal size were divided into two groups. The first group served as a control and was maintained in ideal laboratory condition. From the second group, 10 fishes were subjected to sublethal concentration (1.675 mg/l) of the pesticide, cartriz and the haematological effects were observed at 96 hours (acute), 15 days (sub-acute), 30 days (sub-chronic) and 45 days (chronic) exposure periods.

Haematological profiles were estimated by standard methods[1]. Total RBC and WBC counts were made by improved haemocytometer, haemoglobin estimation was made by Sahli's haemoglobinometer, packed cell volume or haematocrit volume was measured by Wintrobe's method. Oxygen carrying capacity of blood was calculated by multiplying the amount of haemoglobin by 1.25(oxygen carrying capacity of haemoglobin per gram). Clotting time of the blood was determined by the method[13]. The data obtained were presented in tabulated form.

TABLE-1: Changes in haematological parameters of *Channa punctatus* under exposure of sublethal concentration of Cartriz. N=10

Parameters	Control	Exposure Period			
		96 Hrs.	15 Days	30 Days	45 Days
TEC ($\times 10^6$/mm^3)	3.75 ± 0.65	3.60 ± 0.4 (– 4%)	3.50 ± 0.20 (– 6.7%)	3.38 ± 0.25 (– 9.87%)	3.20 ± 0.15 (– 14.67%)
TLC ($\times 10^3$/mm^3)	4.8 ± 0.65	5.0 ± 0.10 (+ 4%)	5.18 ± 0.30 (+ 8%)	5.30 ± 0.15 (+ 10.4%)	5.40 ± 0.25 (+ 12.5%)
PCV %	37.6 ± 0.31	37.10 ± 0.20 (- 1.32%)	37.00 ± 0.25 (- 1.6%)	36.8 ± 0.15 (- 2.12%)	36.60 ± 0.10 (2.66%)
Haemoglobin g/%	10.8 ± 0.35	10.35 ± 0.25 (- 5%)	10.10 ± 0.50 (- 6.5%)	9.90 ± 0.40 (- 8.33%)	9.75 ± 0.30 (- 9.72)
O_2 Carrying Capacity of Hb. (Hb × 1.25)	13.5	12.93 (– 4%)	12.62 (– 6.5%)	12.37 (– 8.37%)	12.18 (– 9.77%)
Clotting Time (in seconds)	110 ± 2	115 + 1	122 + 2	123 + 3	132 + 2

TEC = Total erythrocyte count

TLC = Total leucocyte Count

PVC = Packed Cell Volume

+ = % increase over control

– = % decrease over control

Results and Discussions

The results of the present study are presented in Table-1. The perusal of the Table indicates that there was a significant change in the haematological characters of the fish in varying time exposure.

There was a significant and gradual reduction in total RBC count, haemoglobin concentration, packed cell volume and oxygen carrying capacity of haemoglobin in the treated fish as compared to the normal. The total RBC count in the control fish was 3.75 ± 0.65 million/mm^3 which showed a significant decrease in the cartriz treated fish , the percentage decrease being – 4% ,-6.7%, -9.87%, and -14.67% for 96 hours , 15 days , 30 days and 45 days of exposure respectively.

A gradual decline in the haemoglobin percentage in the treated fish was also observed , the normal value of the haemoglobin was 10.80 ± 0.35g% which got altered by 10.35 ± 0.25 %, 10.1 ± 0.5%, 9.90 ± 0.40% and 9.75 ± 0.30gm% in the treated fish for 96 hours, 15 days, 30 days and 45 days of exposure respectively.

The packed cell volume also registered a decrease in the catriz treated fish, the normal value being 37.67 ± 0.3% which changed over in the range between 36.6-37.0% for varying exposure period.

Similarly, the oxygen carrying capacity of haemoglobin also got altered in the pesticide exposed fish as compared to the normal one.

The total Leucocytes count (TLC) in the control fish was 4.8 ± 0.28×10^3/mm^3.which got a gradual increase in the pesticide treated fish, the range being 5.0 ± 0.1×10^3/mm^3 – 5.4 ± 0.25×$10^3$$mm^3$. Similar trend of increase was also found in clotting time of blood, as has been summarily given in the Table-1.

Changes in the haematological parameters have been widely reported in fishes under pesticide stress. Several authors have studied the effects of agro-chemicals and other pollutants on the blood of fishes and some meaningful conclusions have been drawn. Among them mention may be made[4,8,10,11,12,16] and others . The possible factors involved in the reduction of the total erythrocyte counts , haemoglobin concentration and packed cell volume in the fish, *Channa punctatus* exposed to the agro- chemical , cartriz seem to be due to decreased erythropoietic activity or decreased destruction of RBC. Decrease in haemoglobin concentration indicates poor oxygen transport by blood caused by damaged of RBC or due to increased accumulation of CO_2 in the blood[3, 5]. Decrease in the above parameters may also be ascribed to be decreased iron uptake by the intestinal villi and mucosa, resulting in defective absorption of iron and other substances essential for erythropoiesis.[7, 13, 18].

In the present study increase in total leucocytes count (TLC) in the fish exposed to cartriz could be due to lymphopoiesis or enhanced release of lymphocytes from lymphoidal tissues. The increase in WBC could also be attributed as an adaptive value to the fishes has been previously observed[2,9,14,17,19] and the present study is in consistent with the studies of above workers.

The test fish *Channa punctatus* exposed to cartriz for different exposure periods showed a significant delay in clotting time. Such responses have also been observed by several workers using other chemicals. The fish further develops thrombocytopenia which leads to a concomitant increase in blood clotting time. The pesticide toxicosis triggers a rapid mobilization of haemopoeitic system and the fish normally appears to deal with it by adjusting blood clotting time and thrombocyte concentration.

In view of the present finding it is concluded that the blood of *Channa punctatus* shows immediate response to changes in the external environment which can be reflected in the alteration of the haematological characters in the exposed fish. Hence necessary measures should be adopted to delink the crop-fields with the adjoining water bodies while spraying so as to save the aquatic biota in general specially fish wealth.

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