



STUDIES ON EFFECT OF DICHLORVOS ON HAEMATOLOGICAL PARAMETERS OF *Clarias batrachus*

Priyadarshini Nanda, Siba Prasad Parida

Department of Zoology, School of Applied Sciences
Centurion University of Technology and Management, Odisha, India

ABSTRACT

The haematological study of fish is a vital source to know the health status of the fish. Pesticides are the biological toxicants and become an indispensable. An exposure to pesticides for a considerable length of time is known to cause adverse effects on number of vital functions. Several attempts have been made to study effect of pesticides on different blood parameters in fishes. The present investigation was to study effect of various concentrations of Dichlorvos on Haematology of fish *Clarias batrachus* for 72 hrs.

Keywords: Pesticides, Dichlorvos, Haematology, *Clarias batrachus*, investigation

INTRODUCTION

Fish culture is increasing to compensate the shortage of animal protein all over the world. About 90% of all fresh water fisheries occur in developing countries (FAO, 2007). They provide food and a livelihood for millions of the poor people and also help in economics status, tourism and recreation. It is estimated that freshwater fishes make up more than 6% of the world's annual animal protein supplies for human (FAO, 2007).

Currently it has been realised that a large variety of insecticides to control insect, pests and to augment agricultural yield eventually reach the aquatic ecosystem substantially in runoff where they affect the physiology and behaviour of non-target species. These days' insecticides become an indispensable. It affects many soil and water bodies. Amongst water bodies, fishes are most vulnerable victims. So, this study is on haematological test to know the health status of contaminated fishes. Work on haematology of Indian fish was perhaps published (Eyiunmi *et al.*, 1948). This was a preliminary work on the morphology of corpuscles, erythrocyte and leucocyte count and clotting time of an air breathing fish (*Ophiocephalus punctatus*). Maheswaran *et al.*, (2008) had studied the haematology of *Clarias batrachus* exposed to mercuric chloride. The mercuric chloride treatment inflicted a drastic reduction in the total count of RBC's. The reductions were dosage dependant. Adeyemo (2007) observed changes in *Clarias gariepinus* blood cells after 96 hrs exposure to lead. There was a decline in RBC count and PCV of treated fish but MCV, MCH and MCHC and platelet count increased considerably.

MATERIALS AND METHODS

In the present investigation, live *Clarias batrachus* (N=10) were brought from Unit-4 fish market, Bhubaneswar. The fishes were maintained in well condition and were allowed for the test. To determine the effect of Dichlorvos on haematological parameters, ten fishes were exposed at various concentrations of Dichlorvos for 72 hrs. The concentrations selected for Dichlorvos were 0.5ppm, 3.0 ppm, 6.0 ppm (low dose, medium dose, high dose respectively).

After completion of short term 72 hrs. exposure at various concentrations of Dichlorvos, fish blood samples were collected with the help of sterile disposable syringe. The blood samples were collected in EDTA (Ethylene diamine tetra acetic acid) vials. Various parameters like red blood cell count (RBC), white blood cell count (WBC), Haemoglobin percentage (Hb), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean

Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC) were calculated. Simultaneously, a control test with no pesticide contamination was also maintained for comparison.

Study of total Red blood cell count (RBC) and White blood cell count (WBC) was carried out by using Hayem's solution and WBC diluting fluid manually by using an Improved Neubauer's haemocytometer respectively. Haemoglobin was determined by using Sahli's haemoglobinometer method (Sahli 1962). The Packed Cell Volume (PCV) was determined by method described by Wintrobe (1967).

RESULTS

In the present study, the observations were described in (table-1).

Table-1. Haematological parameter studied of *Clarias batrachus* specimens (N=10)

BLOOD PARAMETERS	CONTROL (X ± S.D)	0.5ppm (LOW) (X ± S.D)	3.0ppm (MEDIUM) (X ± S.D)	6.0ppm (HIGH) (X ± S.D)
RBC (10^6mm^3)	3.04 ± 0.40	2.76 ± 0.12	2.11 ± 0.10	1.46 ± 0.26
WBC (10^3mm^3)	7.49 ± 0.85	6.94 ± 0.20	5.39 ± 0.18	4.75 ± 0.38
Hb (g/dl)	11.71 ± 1.12	10.1 ± 0.40	7.13 ± 0.33	3.88 ± 0.60
PCV (gm %)	30.6 ± 2.83	26.6 ± 1.56	19.2 ± 1.32	11.5 ± 2.94
MCV (μm^3)	101.26 ± 6.56	96.01 ± 2.07	90.69 ± 5.17	76.89 ± 13.40
MCH (Pg)	38.82 ± 3.16	36.19 ± 1.31	33.70 ± 1.14	26.73 ± 1.40
MCHC (%)	38.32 ± 1.85	37.70 ± 1.83	37.26 ± 2.70	35.85 ± 6.73

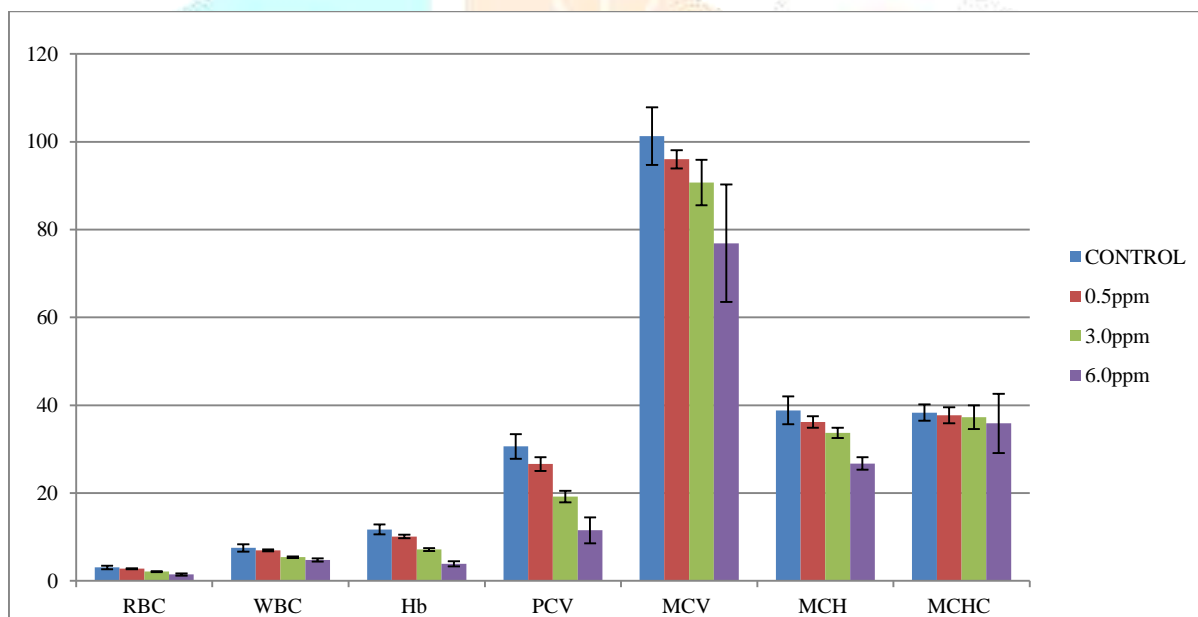


Figure-1 showing comparative haematological analysis of *Clarias batrachus*

During (72 hrs) exposure to Dichlorvos it was observed that haematological parameters such as red blood cell count (RBC), White blood cell count (WBC), Haemoglobin percentage (Hb), Packed cell volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC) gradually were decreased, as compared to control. During this toxicity testing of Dichlorvos it was clearly observed that the changes in haematological parameters of fishes were concentration dependent, that is as concentration of Dichlorvos was increased haematological parameters were decreased.

DISCUSSION

In the present study fish *Clarias batrachus* was exposed to various concentrations of Dichlorvos for 72 hours, and it was observed that Red blood cell count (RBC), Hb percentage and Packed cell volume were decreased as compared to control. The reduction was dosage dependent, it means as concentration of Dichlorvos increased the RBC count, WBC Count, Hb percentage & Packed cell volume declined. Also the MCH, MCV, MCHC were declined. Similar work studied by Singh *et al.*, (2010) that haematological response changes in *clarias batrachus* by treated with Endosulfan. Shinde and Sonawane (2018) also studied the effect of Dichlorvos on *Clarias batrachus* and found similar results in their studies. Das and Mukherjee (2001) studied nuvan effect on

haematology of rohu fish and hematopoietic alterations induced by Carbaryl in *Clarias batrachus* studied by Pattnaik and Patra (2006).

CONCLUSION

The present study reveals knowledge about the haematological parameters of the fresh water fish *Clarias batrachus* in normal condition and in pesticide contaminated conditions (in various concentrations). The investigation may be helpful as a tool to monitor the health status of fishes. Today, pesticides are highly used in agricultural fields. It creates an adverse effect on water bodies, (mainly to fish) when it run off to the nearest water places. So this study reveals the results that how dichlorvos (organophosphate) pesticide affects the haematological parameters of fish. So that, from blood test of fishes, we can know that the fish is really pesticide contaminated or not. Or we can say it can predict the health status of fish.

ACKNOWLEDGEMENT

The author would like to express their thanks to Zoology Department (School of Applied Sciences), Paramedics Department (School of Paramedics and Allied Health Sciences), CUTM, Bhubaneswar for providing facilities for carried out the present research work.

REFERENCES

1. Balaji D. Shinde, Smita R. Sonawane, (2018): Effect of Dichlorvos on fresh water fish *Clarias batrachus* (TFR). Vol. 7 issue (2): page 9-12.
2. Das B. K. and Mukherjee S. C. (2001): Effect of nuvan on haematology of rohu *Labeo rohita* (Ham.); Indian J. Fish. 48(1): 85-92.
3. Eyiunmi F.A., Augustine O, Ovie W.K. (2018) The Hematological parameters of Catfish (*Clarias gariepinus*) fed Fish Feeds with replaced Premix using Moringa Leaf Meal (MLM). *Madridge J Aquac Res Dev.*; 2(1): 35-39.
4. FAO, 2007: The state of Food and Agriculture. FAO Agriculture series no. 38.
5. Maheswaran, R., Devapaul, A., Velmurugan, B., Ignacimuthu, S. (2008): Haematological studies of freshwater fish, *Clarias batrachus* (L.) exposed to mercuric chloride. *Inter. J. Integr. Biol.* 2 (1). 49-54.
6. Patnaik L. and Patra, A. K., (2006): Hematopoietic alterations induced by Carbaryl in *Clarias batrachus* (LINN). *J. Appl. Sci. Environ. Mgt.* September, Vol. 10 (3), 5-7.
7. Sahli, T. (1962): Text book of clinical pathology. (Ed: Scward, Eimiller). Williams and Willams and Co., Baltimore. 35.
8. Singh A.K., Dubey J. K., Mishra D. B., Singh G. and Singh V. B., (2010): Effect of Endosulfan on air breathing freshwater teleost, *Clarias batrachus* (Linn.) a haematological and biochemical response. *The Asian J. Ani. Sci.* 4(2):188-191.
9. Wintrobe M.M. (1967). *Clinical hematology*. 6th Eds. Lea and Febiger, Philadelphia, Library of Congress, Print USA.