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EFFECT OF DICHLORVOS ON HAEMATOLOGICAL PARAMETERS IN FRESH WATER FISH *CLARIAS BATRACHUS* FROM AURANGABAD REGION, (M.S.), INDIA

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ABSTRACT
Present study deals with haematological effect of pesticide Dichlorvos on fish Clarias batrachus. In this study when fish Clarias Batrachus was exposed to various concentrations of Dichlorvos for 96 hrs, 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) were decresed while blood glucose was increased as compared to control.

KEY WORDS: *Clarias batrachus*, Dichlorvos, Blood, Haematological, Glucose.

INTRODUCTION

Pesticides are used in excessive quantity in agriculture which cause potential health hazards to humans and to all forms of aquatic life. 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. Srinivas *et al.*, (2001) studied effect of Malathion and Dichlorvos on *Catla catla.* Amitkumar *et al.*, (2010) studied effect of Endosulfan on haematology of *Clarias batrachus.* Lipica Patnaik et al., (2006) studied hematopoietic alterations induced by Carbaryl in *Clarias batrachus* The aim of present investigation to study effect of various concentrations of Dichlorvos on Haematology of fish *Clarias batrachus* for 96 hrs.

MATERIALS AND METHODS

In the present investigation, live specimens of *Clarias batrachus* were brought from Kaigaon Toka, near from Aurangabad city, (Maharashtra) to laboratory without any mechanical injury. The fishes were maintained in glass aquaria and were allowed to acclimatize for about four weeks before being using for the test. The bioassays were conducted according to the procedure described by APHA (1992).
To determine acute effect of Dichlorvos on haematological parameters, ten fishes were exposed at various concentrations of Dichlorvos for 96 hrs. The concentrations selected for Dichlorvos were 1.80 ppm, 2.65 ppm, 3.5 ppm, 4.35 ppm, 5.20 ppm, 6.05 ppm and 6.90 ppm.

After completion of short term exposure i.e. 96 hrs at various concentrations of Dichlorvos, blood from caudal peduncle of fish was collected with the help of sterile disposable syringe. The blood was collected in bulb and heparin was used as an anticoagulant. 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 and blood glucose were calculated. Simultaneously, a control tank with zero toxicant was also maintained.

Study of total red blood cell count (RBC) and white blood cell count (WBC) was carried out by using Haymem's solution and WBC diluting fluid manually by using an Improved Neubauer haemocytometer. Haemoglobin was determined by using Sahli's haemoglobinometer method (Sahli 1962). The blood glucose was estimated by using phenol sulphuric acid method and by (Electronic) Glucometer. The Packed Cell Volume (PCV) was determined by method described by Wintrobe (1967).

The blood parameters such as Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin Concentration (MCHC) and Mean Corpuscular Haemoglobin (MCH) were calculated as:

$$\text{MCV (in cubic microns)} = \frac{\text{PCV}}{\text{RBCs in millions per cu mm}} \times 10$$

$$\text{MCHC (in per cent)} = \frac{\text{Hb in gm per 100 ml}}{\text{PCV}} \times 100$$

$$\text{MCH (in picogms)} = \frac{\text{Hb in gm per 100 ml}}{\text{RBCs in millions per cu mm.}} \times 10$$

RESULTS

During acute treatment, fish *Clarias batrachus* was exposed to different concentrations of Dichlorvos pesticide for 96 hrs. The concentrations selected for Dichlorvos were 1.80 ppm, 2.65 ppm, 3.5 ppm, 4.35 ppm, 5.20 ppm, 6.05 ppm and 6.90 ppm.

During (96 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 Concentration (MCHC) and Mean Corpuscular Haemoglobin (MCH) were decreased while blood glucose was increased (Table 1.1) as compared to control. During this acute toxicity test to Dichlorvos it was observed that changes in haematological parameters were concentration dependent, that is as concentration of Dichlorvos was increased haematological parameters were decreased except blood glucose which was found to be increased.

DISCUSSION

In the present study fish *Clarias batrachus* was exposed to various concentrations of Dichlorvos for 96 hrs (table 1.1) and it was observed that red blood cell count (RBC), Hb percentage and packed cell volume had decreased as compared to control. The reduction was dosage dependent i.e., as concentration of Dichlorvos increased the RBC count, Hb percentage & Packed cell volume declined. Lakshmanan *et al.,* (2013) studied effect of Dichlorvos to fresh water fish *Oreochromis mossambicus* and observed decline in red blood corpuscle count, Haemoglobin, and Haematocrit (HCt) in all the sublethal concentrations. Similar results were observed in the present study. Lipika Patnaik *et al.,* (2006) observed significant reduction in Erythrocytes, Haemoglobin and PCV (packed cell volume), in fish *Clarias batrachus* when exposed to pesticide Carbaryl for 96 hrs, similar results were observed in the present study.

Table 1.1. Haematological changes in freshwater fish *Clarias batrachus* after 96 hrs when exposed to various concentrations of Dichlorvos.

Parameters	control	Dichlorvos concentrations in ppm						
		1.80	2.65	3.5	4.35	5.20	6.05	6.90
RBC×10^6 mm^3	2.80± 0.02	2.45±0.03	2.31±0.02	2.18±0.03	2.02±0.02	1.84±0.03	1.70±0.02	1.55±0.03
WBC × 10^3 mm^3	6.31±0.04	6.16±0.03	6.06±0.02	5.94±0.03	5.81±0.04	5.72±0.03	5.61±0.02	5.48±0.03
Hb (g/dl)	10±0.1	8.5±0.2	7.8±0.1	7.2±0.2	6.5±0.1	5.8±0.2	5.2±0.1	4.5±0.2
PCV (g %)	25±0.25	21.6±0.30	20±0.20	18.5±0.28	16.9±0.25	15.2±0.32	13.8±0.25	12±0.30
MCV (μm^3)	89.28±0.255	88.163±0.145	86.58±0.115	84.86±0.115	83.66±0.405	82.60±0.395	81.17±0.5	77.41±0.435
MCH (pg)	35.71±0.10	34.69±0.395	33.76±0.14	33.027±0.465	32.17±0.175	31.52±0.575	30.58±0.23	29.032±0.73
MCHC (%)	40.00±0.00	39.35±0.38	39±0.11	38.91±0.495	38.46±0.025	38.15±0.51	37.68±0.045	37.5±0.73
Glucose	70±2	72±1.5	75±2	79±2.5	83±3	84±2.5	88±1	90±2.5

Abdul Majid Tak *et al.,* (2014) studied acute toxicity of pesticide Dichlorvos at different concentrations on fresh water fish, *Cyprinus carpio* and observed reduction in red blood cells, haemoglobin content and Packed Cell Volume (PCV) the decrease observed was dose dependant.

In the present study fish *Clarias batrachus* was exposed to various concentrations of Dichlorvos for 96 hrs (table 1.1). It was observed that in fishes exposed to dichlorvos white blood corpuscle count had decreased as compared to control, the decrease was dosage dependent.

Abdul Majid Tak *et al.,* (2014) studied acute toxicity of pesticide Dichlorvos at different concentrations on fresh water fish, *Cyprinus carpio* and observed reduction in white blood cells indicating decrease in immunity and reduction was dose dependant. Chindah *et al.,* (2004) reported a decrease in white blood cell count in *Tilapia guinensis* after acute exposure to organophosphorus pesticide (Chloropyriphos). The reduction in the leukocyte counts in present study was due to exposure of fish *Clarias batrachus* to Dichlorvos may be due to the malfunctioning of haemopoietic system.

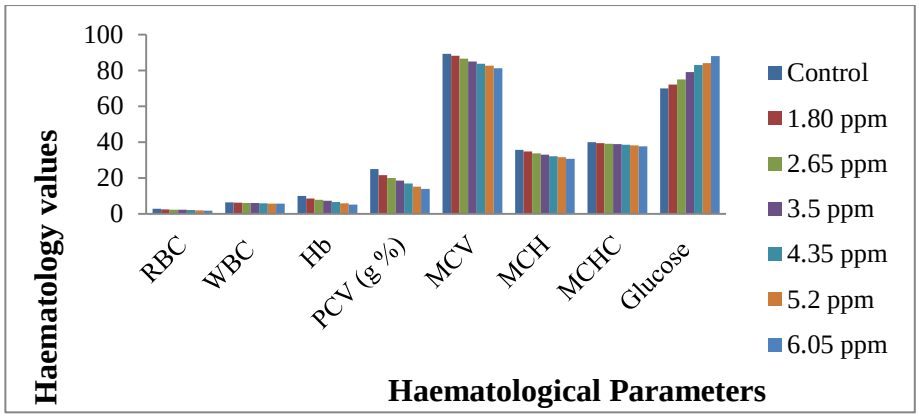

Figure 1.1 Haematological changes in freshwater fish *Clarias batrachus* after 96 hrs when exposed to various concentrations of Dichlorvos.

In present study fish *Clarias batrachus* was exposed to various concentrations of Dichlorvos for 96 hrs (table 1.1) it was observed that Mean Corpuscular volume (MCV), Mean corpuscular Haemoglobin Concentration (MCHC) and Mean Corpuscular Haemoglobin (MCH) were decreased as compared to control. The reduction was dosage dependent i.e., as concentration of Dichlorvos increased the Mean Corpuscular volume (MCV), Mean corpuscular Haemoglobin Concentration (MCHC) and Mean Corpuscular Haemoglobin (MCH) declined. Lipika Patnaik *et al.,* (2006) observed significant reduction in Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin Concentration (MCHC) and Mean Corpuscular Hemoglobin (MCH) in fish *Clarias batrachus* when exposed to pesticide Carbaryl for 96 hrs.

Abdul Majid Tak et al., (2014) studied acute toxicity of pesticide Dichlorvos on fresh water fish, Cyprinus carpio and observed reduction in Mean Corpuscular haemoglobin (MCH). G. V. Venkataraman *et al.,* (2013) exposed fish *Clarias batrachus* to different concentrations of Malathion for 24, 48, 72 and 96 hrs and observed that with increase in concentration and exposure time Mean Corpuscular Value (MCV) values decreased while MCHC and MCH value increased, the increase or decrease was dose dependent. In the present study *Clarias batrachus* was exposed to various concentrations of Dichlorvos for 96 hrs (table 1.1) and it was observed that blood glucose increased as compared to control. The increase in blood glucose was dosage dependent, as concentration of Dichlorvos increased blood glucose also increased.

Amit kumar Singh *et al.,* (2010) studied effect of Endosulfan to median lethal concentration (5.38 ppm) for 24 hrs on air breathing fresh water fish *Clarias batrachus* and observed increase in plasma glucose. B. K. Das et al., (2001) exposed fish Labeo rohita to Nuvan and found that there was an elevation in blood glucose during long term exposure of 45 days. Kori-Siakpere *et al.,* (2007) reported plasma glucose elevation in African catfish *Clarias gariepinus* when exposed to pesticide Paraquat.

REFERENCES

Abdul Majid Tak, F. A. Bhat. Ulfat Jan and Mustafa shah, G. (2014): Sub lethal, Hematological Effects of Dichlorvos on the fresh water fish, *Cyprinus carpio var. Communis. Int. J. Recent Sci. Res.* 5(7):1334-1337.

Amitkumar singh, 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.

Das B. K. and S. C. Mukherjee (2001): Effect of nuvan on haematology of rohu *Labeo rohita* (Ham.); *Indian J. Fish.* 48(1): 85-92.

Kori- Siakpere, Ovie, Adamu, Kabir and Achakpokri and Juliet Aghogho (2007): Sublethal effects of Paraquat on plasma Glucose levels and Glycogen reserves in liver and muscle tissues of African catfish (*Clarias gariepinus*) under laboratory condition. *J. Fisheries Aqua. Sci.* 2(3): 243-247.

Lakshmanan, S, A. Rajendiran and C. Sivasubramaniyan., (2013): Studies on impact of Dichlorvos on selected Haematological parameters of fresh water fish, *Oreochromis mossambicus* (Peters). *Int. J. Res. Bio. Sci.* 3(1): 28-33.

Lipica Patnaik; Patra, A. K., (2006): Hematopoietic alterations induced by Carbaryl in *Clarias batrachus* (LINN). *J. Appl. Sci. Environ. Mgt.* September, Vol. 10 (3), 5-7.

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 Dichlorvos (DDVP). *J. Aqua. Biol.* 16(2): 53-56.

Venkataraman G. V. and P. N. Sandhya Rani. (2013): Acute toxicity and blood profile of freshwater fish, *Clarias batrachus* (Linn.) exposed to Malathion. *J. Academia Industrial Res. (JAIR)* 2(3).

