

ENDSOLFAN PESTICIDE INDUCED HAEMATOLOGICAL ALTERATIONS IN A FRESHWATER FISH *WALLAGO ATTU*.

*Deshmukh D. R. and **Jawale C. S.

*Department of Zoology, Pratishthan Mahavidyalaya, Paithan. M.S., India.

**Department of Zoology, HPT Arts and RYK Science College, Nashik-422005, India.

E-mail : deshmukhdnyan@gmail.com

ABSTRACT

In the present study the fish *Wallago attu* were exposed to 0.0065 ppm concentration of endosulfan pesticide for 96 hours. The haematological parameters such as Red Blood corpuscles (RBC), White Blood (WBC), blood glucose and haemoglobin (Hb) were studied. The parameters such as RBC and Hb were decrease where as WBC and blood glucose were increased.

KEYWORDS: Haematological Alteration, Endosulfan, *Wallago attu*

INTRODUCTION

In fishes the constituents of blood are influenced by many factors like temperature, salinity, oxygen, hydrogen ion concentration of the water which affects the respiratory metabolism and consequently perhaps the blood constituents also therefore it is difficult to establish the normal values for the class as a whole if extensive data is collected for different species and also within a species under different conditions, same range of values can be arrived the data so collected can form a valuable diagnostic aid in fisheries, as a deviation from the normal and serve as a definite clue of the physiological or pathological state.

Toxicants are being introduced into the environment of fishes, such as heavy metals, phenolic derivatives, detergents and pesticides etc. in sublethal doses one would expect the possibility of some haematological changes taking place. Mawdesky Thomas (1971) said, " we are relatively ignorant of fish pathology, fish biochemistry and at the toxic substances being introduced into aquatic environment." It has been shown that some toxic chemicals sublethal dose may substantially result in abnormal fish behavioural pattern in laboratory tests due to some toxicants accumulated in fish tissues.

Many workers studied on haematology of fish. Birendra Kumar and Banerjee (1990) observed the sublethal toxicity of sevin (carbaryl) on blood parameters in *Clarias batrachus*. Prasanta Nanda (1997) studied the effect of nickel stress on Indian cat fish, *Heteropneustes fossilis* and observed the haematological changes. Bhoopathy and Gunasegar (1999) observed the physiological changes due to sublethal concentration of potassium dichromate in the exotic fish *Oreochromis mossambicus* (Trewaves). Ramesh (2001), studied the toxicity of copper sulphate on haematological parameters in freshwater teleost *cyprinus carpio*.

MATERIALS AND METHODS

In the present investigation, live specimens of *Wallago attu* were collected from Kham river near Aurangabad and were brought to the laboratory without any mechanical injury. The fishes were maintained in glass aquaria and were allowed to acclimatize for nearly about four weeks before being used for the test. To determine the effect of acute treatment of endosulfan pesticide on haematological parameters a separate set of experiment was specially run for the short term of 96 hours. Ten fishes were exposed for a period of 96 hours to the LC50 values. The 96 hours LC50 values of endosulfan is 0.0065 ppm after completion of short term exposure the blood from the caudal peduncle of fish was taken with the help of sterile disposable syringe. The blood was taken in bulb and heparin was used as an anticoagulant. After taking the blood the blood parameters like RBC, WBC haemoglobin and blood glucose were calculated. Simultaneously, a control tank was also maintained. Red blood corpuscles and white blood corpuscles were enumerated using Hayem's solution and WBC diluting fluid on Neubauer's improved double chamber counting slide. Blood glucose was estimated by using phenol sulphuric acid method. Hemoglobin was estimated by Sahli haemoglobin method Sahli (1962).

RESULTS AND DISCUSSION

The fishes *Wallago attu* were exposure to endosulfan pesticide for acute toxicity. During the acute treatment the haematological parameters of red blood corpuscles, haemoglobin were decreased while the white blood corpuscles and

blood glucose were increased after exposure to 96 hrs. toxicity are shown in table No.1 .In general the pattern of alteration was similar to that as observed in various pesticides. It was also observed that alterations were dependent on the concentrations and specific toxicant.

Sharma et al. (1982) reported that CCl_4 intoxication induced significant changes in erythrocyte number and differential count of white blood corpuscles in *Clarias batrachus*. The decrease in the number of RBC is due to loss of water from the plasma to the tissue or the haemopoietic organ might have affected which could have reduced the production of red blood corpuscles. Sekar et. al (1996) showed that decrease in the RBC and WBC of *Mystus vittatus* exposed to sublethal concentration of phosphomidon decreased trend in WBC suggested the haematological toxicity of phosphomidon. Erythrocyte level was found to be depressed in fishes subjected to stressful conditions. The reduction in erythrocyte may 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 result in decreased blood cell production and consequent reduction in erythrocyte count.

Ramesh (2001) showed that the fish *Cyprinus carpio* exposed to copper sulphate toxicant shows increase in the erythrocyte and leucocyte counts during the acute toxicity. . Bhoopathy and Gunasegar (1999) showed that the white blood corpuscles increased in number, in the fish exposed to $K_2Cr_2O_7$ clearly exhibiting immune system response to the toxicant but the red blood corpuscles number decreased significantly in the fish exposed to the same toxicant which was due to the damage inflicted by the toxicant to the erythroblasts that produce the RBC and also to the existing RBC.

WBC or leucocytes are one of the important components in blood. They protect the animal during injury, haemorrhage and attack by foreign compounds. They exhibit phagocytic action. Increase in the leucocytes has an adaptive value to meet the stressful condition and defence mechanism. In the present study decrease in Red blood corpuscles due to inhibition of erythropoiesis and increase in white blood corpuscles which exhibits that the immune system response to the pesticide in *Wallago attu* exposed to endosulfan pesticide during acute toxicity treatment. Verma et al. (1998) reported that there was decrease in the haematological percentage in *Oreochromis mossambicus* exposed to agrofens for 96 hours. A drastic decline in blood contents of the exposed fish was observed. This decline was obviously due to diminishing TEC, inadequate haemoglobinization of erythrocytes may also be a cause for the decline in sewage exposed *Heteropneustes fossilis* was observed by Narain and Nath (1982).). Rangaswamy(1984)observed that there is a continuous breakdown of glycogen reserve to meet the energy demand of the fish as a result of pesticide stress, thus increasing the blood glucose level .Another reason for the hyperglycemic condition might be the hypoxic condition to which the animal has been exposed where oxygen consumption of the fish has been reduced after exposure to endosulfan. Thus endosulfan stress also might be induced hyperglycemia through glycogenolysis.

Srinivas et al (2001) reported that the fish *Catla catla* exposed to malathion and dichlorovos pesticide showed that the blood glucose level was increased . Srinivas et.al., (2001) reported that there was significant reduction in haemoglobin after exposing to the pesticides malathion and dichlorovos for acute treatment. The reduction in haemoglobin indicates the occurrence of acute anaemia due to pesticide administration. Svoboda et.al, (2001) reported that the haemoglobin is decreased in the fish *Cyprinus carpio* exposed to diazinon.

Table 1. Changes in haematological parameters in fresh water fish *Wallago attu* exposure for short term (96 hrs.)

Parameters	Short term exposure	
	Control	Endosulfan 0.0065 Ppm
RBC $10^6/mm^3$	3.21 \pm 0.031	1.98 \pm 0.027
WBC $10^3/mm^3$	17.740 \pm 0.623	20.820 \pm 0.848
Blood Glucose mg/100ml	69.0 \pm 4.404	89.0 \pm 4.123
Hb (gm %)	10.6 \pm 0.753	8.9 \pm 0.673

Each value is a mean of 10 observation \pm S.D.

ACKNOWLEDGEMENT

Author is thankful to the Principal Pratishthan Mahavidyalaya, Paithan for providing laboratory facilities.

REFERENCES

- Bhoopathy S and Gunasegar N. (1999).** Potassium dichromate induced physiological changes at sublethal concentration in the exotic fish *Oreochromis mossambicus* (Trewaves). *Proc. Nat. Acad. Sci. India* 69 (B) III and IV
- Birendra kumar and Banerjee V. (1990).** Effects of sublethal toxicity of sevin (Carbaryl) on blood parameters in *Clarias batrachus* (L) Him. *J. Env.* 2001 Vol. 4 PP.166-172.
- Iwama G.K., Greer G.L. and Randall D.J. (1986).** Changes in selected haematological parameter in juvenile *Chinook salmon* subjected to a bacterial challenge and toxicant *J. Fish Biol.* 28: 563 - 52
- Mawdesley - Thomas L.E. (1971).** Toxic chemicals the risk to fish. *New scientist* 49 (734) 74.
- Narain A.S. and Nath. P. (1982).** *Nat Acad. Sci. Letter.* 5: 103.
- Prasanta Nanda (1997).** Haematological changes in the common Indian catfish *Heteropneustes fossilis* under nickel stress. *J. Ecobiol.* 9 (4) : 243-246.
- Rangaswamy C. D. (1984).** Impact of endosulfan toxicity on some physiological properties of the blood and aspects of energy metabolism of a fresh water fish *Tilapia mossambica* (peters). Ph.D. Thesis sri. Venkateshwara university, Tirupati.
- Ramesh M. (2001).** Toxicity of copper sulphate on some haematological parameters of freshwater teleost *Cyprinus carpio* var. *Communis J. Ind. Fish Asso.* 28 : 131-136.
- Sahli T (1962).** Text book of clinical pathology (Ed) seward E. Miller, william and williams and Co. Baltimore 1966 P. 35.
- Sekar P. and Christy (1996).** Haematological changes in the freshwater cat fish *Mystus vittatus* exposed to sublethal concentration of phophamidon. *J. Ecobiol.* 8 (1) : 25-28.
- Sharma R.C. and Neelam Gupta. (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 haemato-biochemistry 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*) *Acta. Vet. Barno* 70: 457 - 465.
- Verma G.P. and Panigrahi pranamita. (1998).** Effect of Agrofene on blood parameters of *Oreochromis mossambica* (peters) *Proc. Nat. Acad. Sci. Ind.* 68 (B) : I