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IMPACT OF ALDICARB ON CERTAIN HEMATOLOGICAL PARAMETERS OF FISH *CHANNA PUNCTATUS* (BLOCH.)

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ABSTRACT: - In the present study an evaluation of impact of carbamate pesticide aldicarb on certain haematological parameters of fish *Channa punctatus* was carried out .After determination 0f LC_{50} ,the sublethal concentration of aldicarb (0.07ml/lt) was used for toxicity experiment. It was found that there was a decreasing trend of total RBC count and haemoglobin while as total WBC count showed increasing trend after 7,14,21, and 28 days intoxication. The decreased haemoglobin, and total RBC count, content observed in this study may be due to the disruptive action on the erythropoietic tissue, which in turn affected the cell viability while as significant increase in WBC count in the present study indicate a hypersensitivity of leukocytes to aldicarb and these changes may be due to immunological reactions to produce antibodies to cope up with stress.

***KEYWORDS*:** Aldicarb,Channapunctatus,haematological parameters,LC_{50}.

INTRODUCTION

Man has attempted to increase the world's food production to solve the problem of malnutrition. He achieved this by increased use of fertilizer to nourish the plant and by increased use of pesticides to protect them from pests. Recently a large quantity of pesticides and fertilizers are used to nourish the plants and food production. These chemical have entered into the aquatic system and create pollution, which pose a great threat to aquatic organisms. Different kinds of more or less persistent chemicals released in the environment ultimately find their way to aquatic environments and cause water pollution Pereira *et al.* (1996) Pesticidal pollution has not only adverse effects on fish production but it also constitutes the most dangerous health hazard. Fishes are quite sensitive to a wide variety of toxicants and are used as bioindicator of pollution in water-quality management(Bantu and Vakita 2013)Aquatic pollution due to pesticide needs considerable attention because of its harmful effects on aquatic organisms which affect the fishing industry. Even sub-lethal concentration of a pesticide may still cause fish mortality in the exposed population after a sufficiently long time of exposure (Ghosh and Shroti 1992). Use of pesticides for control of diseases in agricultural has increased enormously during the last two decades. The surface run off from the agriculture lands carries the pesticide into the aquatic ecosystem, which enter the organisms through food Webs and also through contact in water. Fish blood offers an important profile to study the toxicological impact on animal tissues. Blood is highly susceptible to internal environment. In most cases in the medium for signals in the animal disturbance in integrated functions can be detected or strongly indicated, with rather simple analysis of blood parameters. Blood of fish is sensitive to pollution induced stress and are used to determine tissue dysfunction or damage detection of stress and metabolic disturbance, ion composition for detecting osmoregulation of body. So hematological and physiological biomarkers are frequently used for detecting or diagnosing sub lethal effects in fish exposed to different toxic substances Emad *et al.(*2005). Changes in the biochemical blood profile as the most toxicants exert their effects at basic level of the organisms, fish by reacting with enzymes or metabolites and other functional components of the cell resulting from the effect of pollutant and they make it possible to study the mechanism of the effect of various pollutants Luskova *et al* (2002) .Most of the insecticides are not biodegradable and tend to persist for years together in soil and water.(Sharma 1971).

MATERIALS AND METHODS

Fresh-water catfish, *Channa punctatus* has been selected as a model specimen for the present investigation. The active and healthy specimens of fish were collected from the local fish market in the month of December. The weight and length of the experimental animals varied between 55– 65g and 15 – 18 cm respectively.. The experimental fish *Channa punctatus* were kept in clean and large glass aquaria measuring 75 cm x 37cm x 37 cm which contain 25 liters of water. They were supplied daily with commercial fish food at a rate of 2.5% body weight. The fishes were carefully analyzed and treated before stocking with 0. 2% $KMnO_4$ solution to get rid off any dermal infection. They were acclimatized to the laboratory conditions for 15 days before exposure to experimental chemical. The water used for keeping

experimental fishes was stored before one week to make it free from unfavorable gases. Chlorine free tap water was used throughout the course of the experiment. Various physiochemical characteristics of test water such as temperature, pH and hardness were regularly reported. The water was changed every alternate day. Feeding was stopped 24 hrs prior to the exposure period. One set of fishes was maintained as control group besides experimental group. The experiment was conducted in five aquariums one was used as control and the other for the pollution study. The experimental fishes were exposed to sublethal concentration of 0.07ml of aldicarb at different time intervals of 7,14,21,28 days. The LC_{50} of aldicarb was calculated by probit analysis of Finney. Blood from the experiment and control groups was collected from the cut caudal vein . The blood was used for the haematological estimation of haemoglobin by Sahli's method, Hematocrit was determined by Wintrobe,s method given by Dacie and Lewis(1977) The RBC and WBC counts were made with the help of a Hematocytometer using a Neubauer,s counting chamber by wintrobe' s method (1967).

The experimental data were analyzed by student's 't' test for determining the significance of the changes from control.

RESULTS AND DISCUSSIONS

Channa punctatus exposed to sublethal concentration of 0.07 ml of aldicarb exhibit many hematological alterations have been summarized in tables.

DISCUSSION

Blood is a patho-physiological reflector of the whole body and therefore blood parameters are useful in diagonising the structural and functional status of body organs exposed to toxicants.

Impact of aldicarb intoxication on haemoglobin and total RBC count in experimental fish *channa punctatus*:

Haemoglobin and total RBC count revealed significant decrease after aldicarb intoxication in blood of fish of *Channa punctatus* at the different time interval of (7, 14, 21, and 28 days).

The decreased erythrocyte count and hemoglobin content observed in this study may be due to the disruptive action on the erythropoietic tissue, which in turn affected the cell viability.Our findings gain support with Thakur and Sahai(1987) have reported decrease in haemoglobin percentage in *channa punctatus* when treated with BHC. Shrivastava and Sriwastva(1980) observed cellular and nuclear hypertrophy,change in shape,agglutination and bursting of erthyrocytes in C.mrigala fingerlings treated with urea.Rajeswari (1989) also reported decreased values of haemoglobin ,erythrocyte haemocrit due to the effect of dichlorvos on th fish *Clarias batrachus*. Ramanujam and Mohanty(1997) reported decrease of haemoglobin when exposed to thiodine in fish *Heteropneustes fossils*.They suggested that decrease of haemoglobin was due to mild anemia.. The decrease in haemoglobin may be release of immature cells from haemopoietic tissue into the blood strength as well as disruption of iron that lead to defective haemoglobin synthesis to be of an adaptive value It may also be due to impaired intestinal absorption of iron, as suggested by Joshi *et al*., (2002).Gautam and Gautam (2002) have also observed decrease in RBC and Hb content while increase in WBC of blood in *Channa striatus* treated with endosulfan and diazinon. Seth and Saxena (2003) recorded the declined haemoglobin content as well as binding of chlorpyrifos with haemoglobin rapidly reduced the amount of oxyhaemoglobin in blood and released of free reactive oxygen radicals. Magar and Dube (2012) revealed a declining trend of hae moglobin and erythrocyte count and increasing trend of total leukocyte count indicated toxic effect of malathion on fish *channa punctaus*. Jayaprakash and Shettu (2013) notied there was a significant decrease in the haemoglobin content, total erythrocyte count, packed cell volume, mean corpuscular volume, mean corpuscular hemoglobin concentration, as compared to the respective control fish. after the toxicity of deltamethrin at sub lethal concentrations on fish *channa punctatus.* Sridharan *et al*(2015) observed decrease in erthyrocyte count due to monocrotopus pesticide on fish *Cyprinus carpio* . They suggested decrease erthyrocyte count may be due to disruptive action on the erythropoietic tissue, which in turn affected the cell viability.

Impact of aldicarb intoxication on total WBC count in experimental fish *channa punctatus*:

In the immune system, WBCs are important cells because of their main defensive function. The WBCs respond immediately to the change in medium due to xenobiotic transformation. Total white blood cell count (WBC) revealed very high significant increase after aldicarb intoxication in blood of *Channa punctatus* at the different time interval of (7, 14, 21, and 28 days).

During toxic exposure period of aldicarb, the WBC counts were enhanced. So it indicates that fish can develop a defensive mechanism to overcome the toxic stress Our findings gain support with Mukhopadhyay and Dehadri(1980) noticed increase in leucocyte count and decrease in erythrocytes when exposed to sublethal concentration of malathion. Bhargava and Dixit(1999) recorded increased values of leukocyte count when treated with sublethal concentration of BHC and malathion Deep, H. *et al*.(2002) observed 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 malathion. .El-sayed et al(2007) observed Stimulation of lymphopoiesis and enhanced release of lymphocytes from lymphomyeloid tissue undertoxic stress might lead to an increase in WBC number. Ramesh and Saravanan(2013) reported significant increase in WBC count may be a part of the immunological defence system during prolonged exposure to the pesticide monocrotophos and it appears to be associated with increased level of granulocytes which are known to be responsible for phagocytosis.This suggest that there is development of a certain degree of tolerance during pesticide stress condition.

Table-1 Hematological estimation of haemoglobin(mg/dl) after aldicarb intoxication in *Channa punctatus.*

Hemoglobin (mg/dl)	Control group	Exposure in days			
		7	14	21	28
Range	10.32-12.15	10.22-11.96	10.05-11.65	9.85-11.22	9.77-10.76
Mean	10.50	10.32	10.13	10.00	9.68
± S.Em	± 0.15	±0.14*	0.13*	0.12**	1.11***

Results are expressed as mean ± S.Em
* Significant (P < 0.5 or P = 0.02)
*** Very highly significant (P ≤ 0.001
NS = Non significantly (P ≥ 0.5)
** Highly significant (P ≤ 0.01)

Figure :1 Haemoglobin(gm/dl)

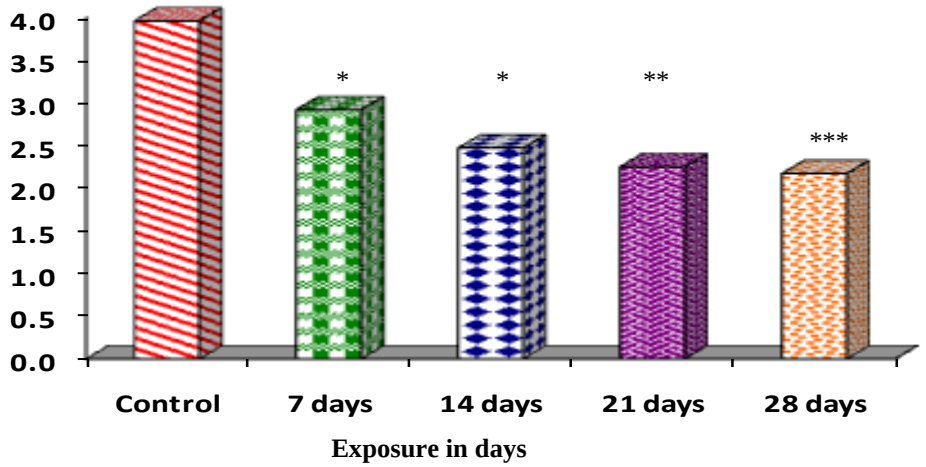

Figure 1:Hematological estimation of haemoglobin after aldicarb intoxication in experimental fish *channa punctatus.*

Table – 2 -Hematological estimation of total RBC count after aldicarb intoxication in *Channa punctatus*.

Total RBC count ($10^6 mm^{-3}$)	Control group	Exposure in days			
		7	14	21	28
Range	3.96-4.15	2.92-3.86	2.47-3.65	2.25-3.62	2.17-3.35
Mean	3.51	3.32	3.13	2.63	2.45
± S.Em	± 0.15	±0.17*	0.21*	0.23**	0.24***

Results are expressed as mean ± S.Em
* Significant (P < 0.5 or P = 0.02)
*** Very highly significant (P ≤ 0.001)
NS = Non significantly (P ≥ 0.5)
** Highly significant (P ≤ 0.01)

Figure; 2 Total RBC count

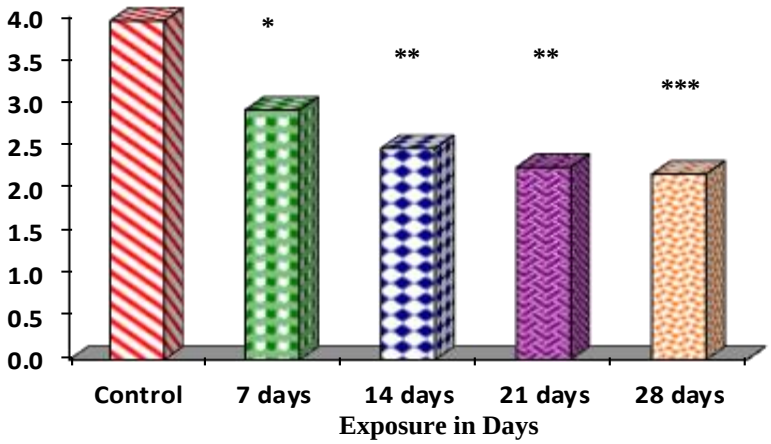

Figure 2:Hematological estimation of total RBC count after aldicarb intoxication in experimental fish *channa punctatus*

Table – 3-Hematological estimation of total white blood cell count after aldicarb intoxication in *Channa punctatus*.

Total WBC count ($10^3 mm^{-3}$)	Control group	Exposure in days			
		7	14	21	28
Range	58.25-63.15	60.92-64.86	63.47-66.65	65.25-69.62	68.17-74.35
Mean	61.51	62.82	64.13	67.63	72.45
± S.Em	± 0.15	±0.14*	0.13**	1.12***	0.11***

Results are expressed as mean ± S.Em
* Significant (P < 0.5 or P = 0.02)
*** Very highly significant (P ≤ 0.001)
NS = Non significantly (P ≥ 0.5)
** Highly significant (P ≤ 0.01)

Fig 3: Total WBC count

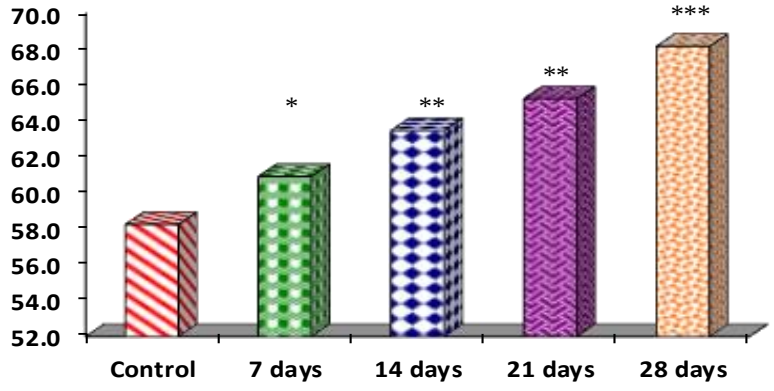

Figure 3 :Haematological estimation of total WBC count after aldicarb intoxication in experimental fish *channa punctatus.*

CONCLUSION:-In the present study haemoglobin and total RBC count showed decreasing trend to sublethal

concentration of aldicarb on fresh water fish *Channa punctatus*(Bloch.) The decreased haemoglobin, and total RBC count, content observed in this study may be due to the disruptive action on the erythropoietic tissue, which in turn affected the cell viability while as total WBC count showed increasing trend in the present study indicate a hypersensitivity of leukocytes to aldicarb and these changes may be due to immunological reactions to produce antibodies to cope up with stress.

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