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Ascorbic Effect on the endosulphan induced alterations in Blood Glucose level of the Freshwater Fish, *Channa orientalis* (Schneider)

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ABSTRACT

The study on fishes and their diseases has importance in life of human being because it has nutritive value. Fresh water fishes, Channa orientalis were exposed to chronic dose of Endosulfan without and with ascorbic acid. Total count Blood Glucose level content was recorded. Remarkable decreases in Blood Glucose level were observed in Endosulfan exposed fishes. Fishes were exposed to Endosulfan with L-ascorbic acid showed less present variation in the Blood Glucose level. Pre-exposed Fishes to pesticides showed fast recovery with ascorbic acid as compared to cured naturally. The role of ascorbic acid on exposure to Endosulfan of an experimental fish, Channa orientalis is discussed in the paper.

Keywords: Endosulfan, Ascorbic acid (50mg/l.), Blood Glucose level, *Channa orientalis* (Schneider).

INTRODUCTION

In vertebrate main function of blood is transportation of oxygen, essential nutrients, and removal of waste products from tissues and organs systems to investigate physiological and metabolic changes. Also it acts as a medium for the translocation of pesticides from the medium to different organs or systems of an animal. The blood carries heavy metals and pesticides to different organ or system hence as blood components are directly affected of blood carries substances. Biochemically its effect is interference with heme synthesis leading to hematological damage [1]. Decrease in hematological parameters in malathion exposed freshwater fish, *Cyprinus carpio*, observed [2].

Endosulfan is a cyclodiene insecticides.The symptoms of poisoning in insects, and animals are hypersensitivity, hyperactivity with violent burst of convulsions and finally complete prostration with convulsive movement, disturbance in the ganglia of the central nervous system rather than in the peripheral nerves. Low concentration of endosulfan affects different body systems [3].

Ascorbic acid plays an important role in distribution and excretion of toxic metals. Ascorbic acid has reversed dysfunction of cells lining blood vessels. The normalization of functioning of these cells may be link to prevention of heart diseases [4]. It has been realized that antioxidant can play significant role in the treatment of metal induced oxidative stress. Some antioxidants behave as efficient chelators [5]. The SH group of protein is mainly responsible metal interaction or bindings L-ascorbic acid is antioxidant and may extent in protective effects by chelating the metal and removing them from the system [6] .

During toxicosis ascorbic acid indicate positive role in detoxification. It is necessary for the synthesis of collagen, growth and maintenance of epithelial tissue. It can acts as a hydrogen carrier it may have an essential role in the metabolism of carbohydrate or protein or both. It appears to function it maintaining strength in blood vessels.

MATERIALS AND METHODS

Medium sized fresh water fishes *Channa orientalis* were collected from shiven river area Nandurbar Dist. Nandurbar. The physico-chemical parameters of the water used for the maintenance of the fishes were analyzed as per the methods given in [7]. The fishes were divided in to three groups A, B and C. Group A fishes were maintained as a control. The Group B fishes were exposed to $LC_{50/10}$ dose of Endosulfan (0.07511 ppm) for 30 days, while group C fishes were exposed to respective chronic concentration of pesticide with 50mg/l. of ascorbic acid for 30 days. Fishes from B groups were divided into two groups after 30 days exposure to Endosulfan into D & E groups. Fishes of D groups were allowed to cure naturally while those of E groups were exposed to ascorbic acid (50 mg/l.). Blood glucose content were recorded from A, B and C group fishes after 15, and 30 days of exposure and from D and E groups after 35'th and 40'th days of recovery.

Blood was obtained by cutting the caudal peduncle dissection method [8, 9], using heparin as anticoagulant. First few drop were discarded and only the first 2ml. of blood was taken since the entry of lymph into the blood is reported [10] to affect haematocrit value. The blood glucose was determined by the method [11].

Table 1. Physico-chemical parameters of water used for experimentation.

Temperature	25·1 ± 3·2^{0}
PH	7 · 6 0 ± 0 · 3
Conductivity	140 ± 15.7 µ mho$^{-cm.}$
Free Co2	3·34 ±1· 3 ml$^{1.}$
Dissolved O2	6·3 ± 1·1 ml^{1}.
Total Hardness	204 ± 12·0 mg $^{-1}$.
Total Alkalinity	585·6 ± 32.8 mg $^{-1}$.
Magnesium	31·67 ± 2.9 mg $^{-1}$
Calcium	30·46 ± 3.06 mg $^{-1}$
Chloride	107·92 ± 16.34 mg $^{-1}$.

Table 2. Blood glucose in *Channa orientalis* after chronic exposure to Endosulfan without and with ascorbic acid (Values are expressed in mg of glucose /100ml).

Group	Treatment	15d	30d	35d	40d
A	Control	89.53±0.48	88.86±0.83	--	--
B	Endosulfan (0.07511ppm)	82.8±0.50** (-7.51)	71.46±0.1*** (-19.58)	--	--
C	Endosulfan (0.07511ppm) +A A	85.03±0.3** (-5.02)	82.0±0.81** (-7.72)	--	--
D	Recovery in Normal Water	--	--	74.9±0.15 $^{\Delta\Delta}$ [+4.81]	76.1±0.13 $^{\Delta\Delta\Delta}$ [+6.49]
E	Recovery in AA	--	--	77.2± 0.49$^{\Delta\Delta\Delta}$ [+8.03]	81.33 ±0.46$^{\Delta\Delta\Delta}$ [+31.81]

AA = Ascorbic acid (50 mg/l)., ± indicates S.D. of three observations. Values in ( ) indicates percent change over respective control. Values in [ ] indicates percent change over 45 days of respective B.
** indicates significance with the respective control.*
*$^{\Delta}$ indicates significance with 45 days of respective B.p<0.05 = *&$^{\Delta}$, p<0.01 =**&$^{\Delta\Delta}$, p<0.001 = *** &$^{\Delta\Delta\Delta}$, ^{NS} and $^{\Delta NS}$ = Not significant.*

RESULTS AND DISCUSSION

Fishes experimentally exposed to Endosulfan for a period of 15, and 30, days in a group B and C showed significant decrease in blood glucose in Endosulfan exposed fishes. When dose of Endosulfan along with ascorbic acid was given the depletion in blood glucose was 81.33 for 40 days observation. The pre exposed fish to Endosulfan for 40 days showed fast recovery in blood glucose and significant improvement with ascorbic acid as compared to those cured naturally in normal water after 5 and 10 days.Post stressor increase in blood glucose level may be used as indicator of the secondary phase of stress response [12]. These changes include an activation of liver glycogenolysis and glycolysis as well as increased level of plasma glucose and lactate. A significant increase in conc. of the enzymes in blood plasma indicates tissue impairment caused by stress [13]. Blood glucose in pesticides decrease indicates damage to gills. [14]. observed decrease in blood glucose in $PbCl_2$ as compare to $CdCl_2$ exposed fishes. When dose of $PbCl_2$ and $CdCl_2$ along with ascorbic acid was given the depletion in blood glucose.

[15] 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. Endosulfan stress induced hyperglycemia through glycogenolysis. The hyperglycemic condition might be the hypoxic where oxygen consumption of the fish has been

reduced. [16] reported that the fish, *Catla catla* exposed to malathion and dichlorovos pesticide showed that the blood glucose level was increased.

The alterations in hematological parameter caused by pesticides were on the basis of chemical nature and time dependent and the toxicity of pesticides constitute certain health indices. Hypoglycemic response in the treated fish is due to the rapid utilization of blood glucose during hyper excitability, tremors, impaired liver function and convulsions which are the characteristic behavior of toxicosis in fish and mammals, [17].

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