The Biobrio ISSN : 2393-9508
An International Quarterly Journal of Life Sciences
Website : www.thebiobrio.in
3 (1&2) : 140-142, 2016

Effect of Oberon (Insecticides) and remedial impact of Tulsi (*Oscimum sanctum*) on blood glucose level of an air breathing fish *Channa panctatus*

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ABSTRACT

Channa punctatus were exposed to various test concentration of Oberon (Pesticide) for 96 hour along with the control utilizing 10 animals. Blood glucose decreased in all the test concentration of Oberon. Plasma protein and total cholesterols decreased significantly. The hypoglycemic response may be a result of greater energy requirement with inadequate supply of energy source due to increased metabolic activities. Oberon causes severe damage to the fish by the means of hypoglycemic response but Tulsi plays the vital role in combating the deleterious effects of Oberon at each level. Tulsi is the best antidote against the Oberon induced toxicity.

Key Words: Oberon, *Channa punctatus*, Tulsi, Blood Glucose Level.

INTRODUCTION

The fish serves as bio-indicator of water quality and the impact of the pesticide can be well understood by analyzing either blood or serum of the fish because blood is a pathophysiological reflector of whole body (Sharma and Singh, 2004; 2006)

Studies have proven that pesticides are pollutant of aquatic environment as the affect fish directly by accumulation in their body. They cause serious impairment in metabolic physiological and structural changes in different organs. Pesticides affect specific vital organs such as liver, gill and kidney. Liver contains the highest pesticide concentration because it is an organ of storage and detoxification of pesticide. Liver plays an important role in detoxification and also act as an active site of pathological effects induced by contaminants. Glucose serves as tissue metabolic fuel and circulates through blood to different parts of the body. Glucose is stored in animal body especially in liver as glycogen which can be used during need of animal.

In the present study on *Chana punctatus* there was significant decrease in the blood glucose levels after Oberon exposure. But after Tulsi treatment there was significant increase in the blood glucose level.

MATERIALS AND METHODS

Live specimens of *Chana punctatus* (*Garai*) were procured from Dumka fish market and were acclimatized in laboratory before experimentation. The fishes were kept in big aquaria (50 gallon capacity). The animals were fed with chopped goat liver and earthworms. Care was taken to keep the animals healthy and free from parasites.

Age group of *Chana punctatus* ranging from 70-80 ± 10 gram and sizes between 4.5'' ± 2'' were collected for study from fish farm which is free from any industrial pollutant and effluents. Seasonal temperature fluctuations were 5^{o}C – 45^{o}C and relative humidity was 32 - 90% showing humid subtropical climate.

These fishes were washed with $KMNO_4$ solution for proper disinfection and kept in different sized large, plexigass aquaria having dechlorinated aerated tap water at NTP.

Collection of Blood :

The blood from the control and treated fish has been taken out as a sample to test and collect the data. Blood samples were obtained from fish by pulmonary aorta of heart or the base of caudal peduncle. Serum was obtained from the blood for the estimation of various biochemical parameters.

Blood of individual fish of each treatment group were taken in separate titration tube. After separation of the serum it was collected in separate small, labeled vials.

Biochemical analysis

Estimation of glucose level

Principle

Glucose oxidase (GOD) oxidizes glucose to gluconic acid and hydrogen peroxide. In presence of enzyme peroxidase released hydrogen peroxide is coupled with phenol and 4-Aminoantipyrine (4-AAP) to form coloured quinoneimine dye. Absorbance of coloured dye is measured at 505 nm and is directly proportional to gluecose concentration in the sample.

$$\text{Glucose} + O_2 + H_2O \xrightarrow{\text{glucose oxidase}} \text{Gluconic acid} + H_2O_2$$

$$H_2O_2 + \text{Phenol} + \text{4-AAP} \xrightarrow{\text{Peroxidase}} \text{quinoneimine} + H_2O$$

Procedure

Blank the analyzer with reagent Blank.

Measure absorbance of standard followed by the test

Calculation were done using following formula

$$\text{Serum/plasma glucose (mg/dl)} = \frac{\text{Absorbance of Test}}{\text{Absorbance of Standard}} \times 100$$

RESULT & DISCUSSION

Mean Glucose level of *Channa punctatus* exposed to sub lethalconcentration (1.5 ppm) of Oberon in 24hrs, 48hrs, 72hrs and 96 hrs were shown in the table. The mean glucose level went down after exposure of Oberon treatment with compare to control. Whereas after Tulsi administration for 5 days, 10 days and 15 days showed amelioration and glucose level were observed towards control value.

Various studies done on different other fishes have also observed the similar effects. In a study on *Clarias*

Table-1. Mean Glucose level of *Channa punctatus* exposed tosub lethal concentration (1.5 ppm) of Oberon in 24hrs, 48hrs, 72hrs and 96 hrs.

Parameter	Concentration	Control	Oberon Treated			
			24hrs	48hrs	72hrs	96hrs
Glucose mg/dl	1.5 ppm	66.00± 0.577	57.00± 0.565	45.00 ± 0.555	38.00 ± 0.545	22.00 ± 0.534

Table-2. Mean Glucose level of Channa punctatus exposed to sub lethal concentration (1.5 ppm) of Oberon in 24hrs, 48hrs, 72hrs and 96 hrs.

Parameter	Concentration	Control	Oberon treated 1.5 ppm for 96 hour followed by Ocimum sanctum treated – 100 mg/kg b.w.			
			96 hrs Oberon Treated	5 Days Tulsi Treated	10 Days Tulsi Treated	15 Days Tulsi Treated
Glucose mg/dl	1.5 ppm	66.00± 0.577	22.00 ± 0.534	36.00 ± 2.646	44.00 ± 1.155	56.33 ± 0.881

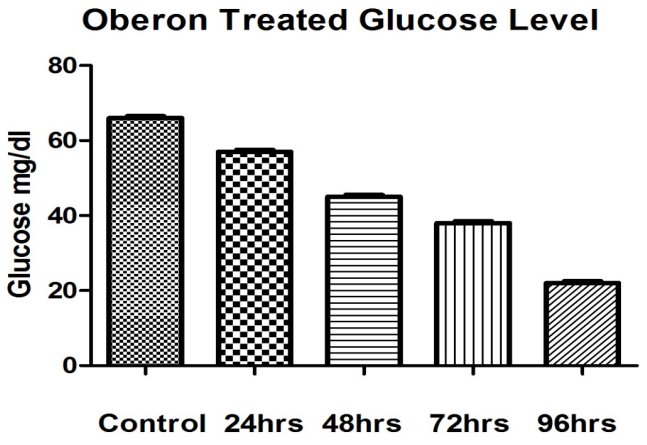

Fig.-1

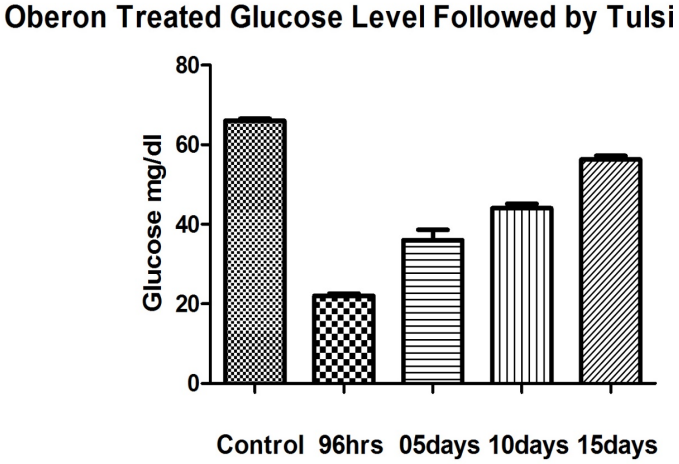

Fig.-2

there was a decrease in glucose value. Cadmium like heavy metals have affinity for ligands like phosphate, cystenyle and histidyl side chains of proteins, can bind with carrier protein molecules resulting in inhibition of sugar and amino acid transport (Alvarado, 1966). According to Lall *et al*,. (1997) metal ions block the active absorption of glucose by the intestinal epithelial cells. Many other workers reported hypoglycemic condition in air breathing fishes due to contaminants (Kurde, 1990, Sastry and sunita 1983). This may be to cope with high-energy demand in stress situations. *Clarias* is more active than Ctenopharyngodon, toxicity tests showed that cadmium is more toxic to non-air breathing fishes. In glucose levels of Ctenopharyngodon, showed initial increase and then a decrease. It may be due to liver impairment to utilize glucose for glycogenolysis (Shastry and Sunita, 1982). Such a situation may be attributed to higher activities of enzymes participating in gluconeogenetic mechanisms, since enzymes of gluconeogenesis are reported to be induced by various toxicants (Shaikh and Hiradhar, 1985; Silbergeld, 1974).

CONCLUSION

The objective of the present investigation is to ascertain the toxic impact of Oberon a most commonly used insecticide on an air breathing fish *Channa punctatus.* From the observation it was concluded that -Oberon causes severe damage to the fish at haematological level, biochemical level and also at cellular level. But, Tulsi plays a vital role in combating the deleterious effects of Oberon at each level. Thus, Tulsi is the best antidote against the Oberon induced toxicity.

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