RESEARCH ARTICLE

Lancergold induced toxic impacts on glycogen content of liver and gonads of a freshwater fish, *Labeo rohita*

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ABSTRACT

In the present study, effects of an insecticide Lancergold on glycogen content in the tissues like liver and gonads of a freshwater fish, *Labeo rohita* were studied during acute period (24 to 96 hrs). The LC_{50} value of Lancergold was found to be 3.1ppm for 96 hrs. Fishes were exposed to lethal concentration of Lancergold under laboratory conditions. Then tissues like liver and gonads were removed carefully from the control and experimental groups. These tissues were used for glycogen estimation. Results of the present investigation showed decreased level of glycogen in both the experimental tissues as compared to the control.

Keywords: Lancergold, *Labeo rohita*, Liver, Gonads, Glycogen.

INTRODUCTION

Freshwater is one of the most important resource required essentially for the life but the different types of pollutants like agricultural, industrial and municipal wastes change the quality of water. Pesticides used in agroecosystem for killing insect pests and better crop production leave residues in water and soil even after several days of the spray in the crop fields (Remia *et al*., 2008). These pesticides reach to the aquatic ecosystems by many ways like rainfall, floods etc. and pollute them. Many non-target organisms like fish, bivalves, crabs etc. get adversely affected. These pollutants enter in the body of aquatic animals through mouth, gills, skin and produce many hazardous effects on their vital processes. They damage their different organs as well as systems and produce disturbances in physiological and biochemical processes.

Water pollution is recognized globally as a potential threat to both human and other animal populations which interact with the aquatic environment (Bose *et al*., 2011). Today, Lancergold used widely in fields. It is an insecticide. It contains acephate, imidacloprid, alkyl naphthalene sulphonate (surfactant) and precipited silica (inert).

Imidacloprid is a systemic insecticide which is widely used in the whole world at current period. Fishes are mainly utilized as food materials amongst all the aquatic animals. *L. rohita* is common edible and one of the prime cultured fish. *L. rohita* also has more tremendous economic importance. Most of the pesticides are metabolic depressors so they disturb

the biochemical procedure and affect the activity of biomolecules like proteins, carbohydrates and lipids. Hence, the present investigation has been undertaken to study the biochemical alteration in tissues like liver and gonads of a freshwater fish, *Labeo rohita* specifically in glycogen content induced by an insecticide, Lancergold.

MATERIALS AND METHODS

The fishes *Labeo rohita* were collected from the Ganeshpur, Gadad and Girna river dam near Chalisgoan city, Dist. Jalgoan, Maharashtra, India. They were collected from their natural habitat and brought to the laboratory. The LC_{50} values are determined by Finney, (1971) method. The fishes were acclimatized to the laboratory conditions for 10 to 15 days prior to subjecting them to experiments. Well aeration is maintained for oxygen. Healthy and active fishes were chosen for experiments. Two groups of these fishes were formed. One group was considered as experimental group exposed to reagent grade of Lancergold for acute exposure (24 to 96 hrs). Another group was treated without pollutants and was considered as control. Biochemical parameter was assessed in five individual animals, pesticide treated and control groups were prepared. The fishes were starved for one day prior to experimentation in order to avoid the metabolic differences, if any due to differential feeding and food reserves.Glycogen was estimated from liver and gonads of *L. rohita* by Anthrone reagent method (Dizwann and Zandee, 1972).

RESULTS AND DISCUSSION

The results of present study revealed that, after acute (24 to 96 hrs) exposure to Lancergold, glycogen content of liver and gonads of a freshwater fish, *L. rohita* was decreased as compared to the control. Results are summarized in the table 1 and Fig. 1.

Glycogen is stored in the tissues in the form of carbohydrates which may provide a reserve food energy during stress. Glucose and glycogen are the main sources of energy for all vital activities of the body which are present in the carbohydrates. Carbohydrates are considered to be the first among the organic nutrients to be depleted and degraded in response to stress conditions imposed on animal (Nagaraju and Venkata, 2013).

Reduction in glycogen level may be due to inhibition of hormones which are involved in the synthesis of glycogen. Depletion of glycogen may also be due to direct utilization for energy demand caused by pesticidal stress. Similar reduction in glycogen concentration in tissues like liver and gonads of a fish, *Channa gachua* (Ham) after chromium toxicity was reported by Kawade and Khillare, (2012). Reduction in glycogen level were also reported earlier by Dubale and Shah, (1981); Sastry and Subhadra, (1982); Bedi and Kanan, (2005); Ganeshwade *et al*., (2011); Chezhian *et al*., (2010) and Sreenivasa, (2002).

Glycogen mobilization is maximum in the liver because liver is the seat of glycogen metabolism supplies glycogen for producing more energy to combat pesticidal stress. According to Dezwan and Zandee, (1972), a drop in tissue glycogen content may

Table 1: Toxic impact of insecticide, Lancergold on Glycogen contents in Liver and Gonads (Testis and Ovary) of *Labeo rohita* after acute (24 to 96 hrs) exposure.

Tissue	Treatment	Acute			
		24 hrs	**48hrs**	**72hrs**	**96hrs**
Liver	Control	8.4505 ±0.008246***	8.3939 ±0.010392***	8.3548 ±0.145602***	8.2829 ±0.000078***
Testis	Control	7.6851 ±0.006164***	7.6249 ±0.009165***	7.5536 ±0.008831***	7.5431 ±0.02607***
Ovary	Control	7.3768 ±0.034058***	7.3764 ±0.03286***	7.3762 ±0.02898***	7.2961 ±0.05639***
Liver	Lancergold	7.4768 ±0.03405***	7.3264 ±0.03286***	7.0124 ±0.02898***	6.5489 ±0.05639***
Testis	Lancergold	6.8671 ±0.006928***	6.4623 ±0.006164***	5.9402 ±0.01077***	5.0124 ±0.008246***
Ovary	Lancergold	7.0001 ±0.04049***	6.7631 ±0.04795***`	6.5892 ±0.03714***	6.0271 ±0.02683***

Values expressedas mg/100mg of wet wt. of tissues, ± indicate S.D. of five observations, values are significant at P<0.001***.

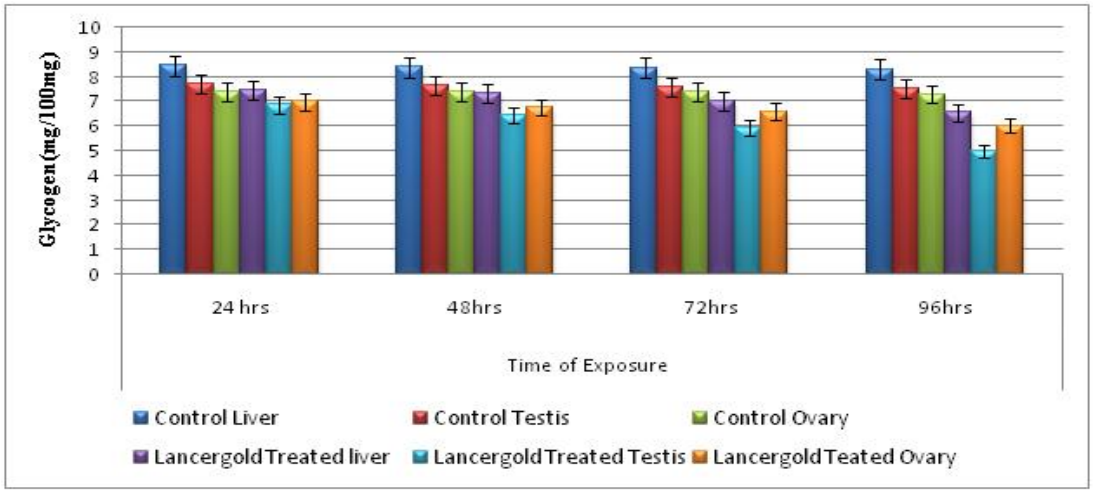

Fig.1 Variation in Glycogen content of liver and gonads of freshwater fish, *Labeo rohita* after acute exposure to an insecticide, Lancergold.

also be either due to decreased synthesis as a consequence of toxic stress and breakdown. Decreased glycogen level in various tissues of fish due to pollutants were observed by Asifa and Vasantha, (1994) in *Clarias batrachus* after endosulfan exposure; James and Sampath, (1995) in *Heteropneustes fossilis* (Bloch) after copper and ammonium mixture toxicity; Shobha *et al*., (2000) in *Tilapia mossambica* due to sodium arsenate intoxication; Rawat *et al*., (2002) in *Heteropneustes fossilis* after endosulfan exposure; Binukumari and Vasanthi, (2013) in *Labeo rohita* after dimethoate 30% EC intoxication.

According to Nagaraju and Venkata Rathnamma, (2013), depletion in the total glycogen in all the vital tissues may be attributed toxic stress resulting in the disruption of enzymes associated with the carbohydrate metabolism. Stepped up glycogenolysis leads to a decrease in glycogen content (Koundinya and Ramamurthy, 1980). Whereas Martin and Arivoli, (2008) suggested that, the depletion of glycogen explains the increased demand of these molecules to provide energy for the cellular biochemical process under toxic manifestation.

CONCLUSION

In the present investigation, an insecticide Lancergold caused decrease in glycogen level of the liver and gonads of freshwater fish, *Labeo rohita* during acute exposure period. It can be concluded that the toxicity of this insecticide may lead to severe effect on aquatic animals.

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