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Confidor and Bavistin induced effects on total glycogen content in liver and gonads of Snakeheaded Fish, *Channa gachua*

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Abstract

Toxicity tests were conducted on freshwater fish, *Channa gachua* and glycogen content of the tissues like liver and gonad were calculated after acute exposure of toxicants like Confidor and Bavistin upto acute exposure at specific time interval of 24, 48, 72 and 96hrs. In the present study, alteration in the glycogen content was observed due to pesticidal intoxication. There was significant decrease in total glycogen content of the experimental tissues as compare to the control tissue. Confidor was found to more toxic than Bavistin to the freshwater fish, *Channa gachua*.

Keywords: *Channa gachua*, Confidor, Bavistin, liver, gonad, glycogen

1. Introduction

In agriculture, wide and high usage of pesticides leads to creating awareness about their toxicity in the aquatic environment [1]. These pesticides originate from agricultural wastes containing hazardous chemical compounds often pollute natural waters. Fishes among the aquatic habitants are the most susceptible and more vulnerable to contaminants than any other aquatic animals [1, 2]. Snakeheaded fish *Channa gachua* is popular edible fish in Khandesh region and other places and it is eaten by majority of peoples. Freshwater fishes are get target directly or indirectly by water pollution.

Carbohydrates are mainly used to meet higher energy demand to combat the stress induced by pollutants. Study of carbohydrates especially glycogen levels with respect to pesticidal stress can be considered as a first step in the biochemical analysis. Glycogen is the major source of energy in animal cell, so the biochemical processes are dependent on the supply of glycogen and liver plays an important role in the glycogen metabolism. Hence in this context, an attempt was made to investigate the level of glycogen in the freshwater fish, *Channa gachua* after exposure to an insecticide Confidor and fungicide Bavistin.

2. Materials and Methods

The fish *Channa gachua* were collected from the Gadad and Girna river dam near Chalisgoan city, Dist Jalgaon in Maharashtra. They were collected from their natural habitat and brought to the laboratory. Physicochemical parameters of water were analyzed by following standard method of APHA [4]. The fishes were acclimatized to laboratory condition for 10 days prior to subjecting them to experiments. Healthy and active fishes were chosen for experiments. Static bioassay studies were carried out by Finney's [5] method. Two groups of these fishes were formed. One group was considered as experimental group exposed to reagent grade of Confidor and Bavistin for 24, 48, 72, and 96 hours for acute exposure. Another group was treated without pollutants and was considered as control.

Biochemical parameter was assessed in five individual animals, pesticide treated and control groups are made. 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 by Anthrone reagent method [6] from control and experimental fishes. The glycogen content was calculated as percentage of wet weight. Each observation was confirmed after repeating it at least five times. Standard deviation and probability tests were performed as described by Bailey [7].

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3. Results and Discussion:

The changes in biochemical composition of liver and gonad of fresh water fish, *Channa gachua* exposed to acute treatment of Confidor and Bavistin were studied along with experimental animals with respects to the percentage of glycogen in wet tissue. The glycogen content of the liver and gonad was found to be decreased after acute treatment by Confidor and Bavistin. The decrease percentage of glycogen in liver after 96 hours treatment with Confidor and Bavistin was 0.2878 to 0.1159% and 0.3056 to 0.2701% respectively. The average glycogen contents of gonad was decreased from 0.7348 to 0.4565% and 0.7784 to 0.7387%. The percent depletion in glycogen content was found more in the liver than gonad after pesticidal stress as a period of exposure increased. Confidor is more pronounced as compared to Bavistin. Maximum depletion of glycogen level occurred in the liver followed by gonad. Results were summarized in table and graphs.

Depletion in glycogen content indicates greater conversion of glycogen to glucose for energy requirement under stress condition. It means that depletion of glycogen content in tissues seems to be the physiological manifestation to stress. Carbohydrates are most rapidly utilized in organisms as the immediate source of energy to meet the enhanced demand of energy under stress condition in fishes [8, 9, 10, 11]. Depletion in glycogen in muscle, gills, liver, heart and kidney of *Catla catla* after cadmium chloride exposure and due to that glycogen reserves are being used to meet the stress through glycolysis or hexose monophosphate pathway [12]. Glycogen levels in gills, liver, kidney, ovary and testis of freshwater fish, *Channa gachua* were reduced after chromium toxicity [13]. Decrement in glycogen content of liver after cadmium toxicity of freshwater fish, *Cyprinus carpio* (Linn) [3]. Decreased level of glycogen were found in liver, gonad and other tissues after acute exposure to chromium in *Channa gachua* [14].

Table 1: Effect of insecticide Confidor and fungicide Bavistin on Glycogen in liver and gonad of *Channa gachua* during period of acute exposure.

| Tissue | Treatment | Acute | | | |
|--------|-----------|--------------------|--------------------|---------------------|---------------------|
| | | 24h | 48 h | 72 h | 96 h |
| Liver | Control | 0.3390 ±0.01389 | 0.3281 ±0.01288 | 0.3201 ±0.01467 | 0.3199 ±0.01262 |
| Gonad | Control | 0.8275 ±0.01286 | 0.8198 ±0.01302 | 0.8137 ±0.01566 | 0.8113 ±0.01387 |
| Liver | Confidor | 0.2878 ±0.09267 | 0.2206 ±0.01627 | 0.1533 ±0.01990 | 0.1159 ±0.03531 |
| Gonad | Confidor | 0.7348 ±0.05202 | 0.6421 ±0.02109 | 0.5493 ±0.02026 | 0.4565 ±0.01844 |
| Liver | Bavistin | 0.3056 ±0.02549 | 0.2907 ±0.01923 | 0.2865 ±0.020314 | 0.2701 ±0.01431 |
| Gonad | Bavistin | 0.7784 ±0.03828 | 0.7553 ±0.01656 | 0.7419 ±0.01235 | 0.7387 ±0.017639 |

Values expressed as % of wet wt. of tissue, ± indicates S.D. of five observations; values are significant at $P < 0.05^{**}$

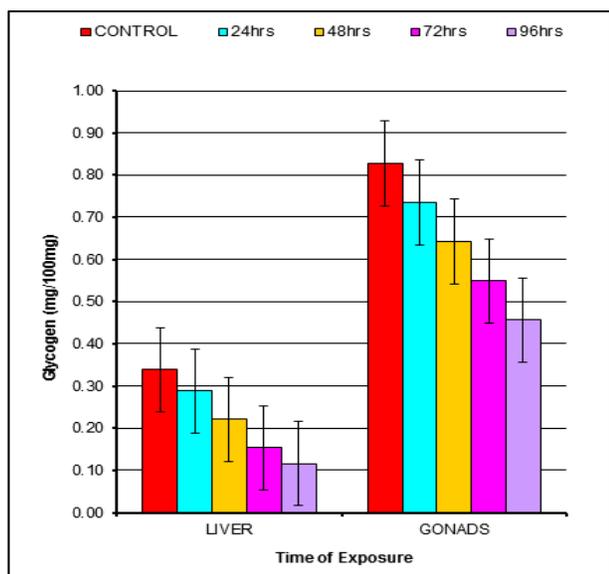


Fig 1: Variation in Glycogen content of Liver and Gonad of *Channa gachua* after acute exposure to Confidor.

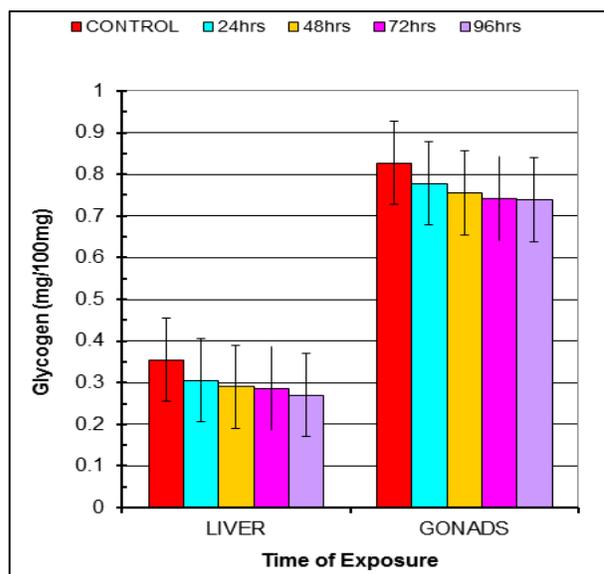


Fig 2: Variation in Glycogen content of Liver and Gonad of *Channa gachua* after acute exposure to Bavistin.

4. Conclusion

In the present investigation, significant decrease in total glycogen content of the experimental tissues as compare to the control tissue. Confidor was found to more toxic than Bavistin to the freshwater fish, *Channa gachua*.

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