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THE PESTICIDE ENDOSULFAN EFFECT ON BIOMOLECULE GLYCOGEN CONTENT OF FRESH WATER FEMALE CRAB BARYTELPHUSA CUNACULARIS

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ABSTRACT :

The pattern of civilization interfering in agricultural issues. According to many biodiversity researchers for controlling crop pest use of endosulfan of lot of emulsified concentration are regularly used. The regular use of endosulfan effects on biodiversity of flora and fauna. Especially the effect occurs in aquatic animals like crab.

The endosulfan is not dissolved in water so far it present in soil, water, on plant debris etc. These residues found in deposited form in body of aquatic animals like crab. When this deposition found, it directly or indirectly effect on various parameters of physiological and metabolically activity.

The study about effect of endosulfan which regularly utilized in paddy field, deposited in water where the aquatic fauna like crab specially female crabBarytelphusa Cunacularis suffering from physiological problem. The glycogen is important bimolecular in life science which play an important role in body building and activity of physiology as well in metabolism. The current study focused about variation found in glycogen content touch the result and discussion with table and graphically.

Keyword: *Endosulfan, Glycogen content, female crab Barytelphusa Cunacularis.*

INTRODUCTION

Glucose occupies the central position of carbohydrate metabolism in an organism, representing complex groups, sequences and cycles of reactions which integrate at various points with reactions concerned with metabolism of lipids and of proteins as these molecules serve the source of carbon in the synthesis of cellular components.

The chief carbohydrate of the solid tissues, while glucose is of the blood and other body fluids. Glycogen, a reserve, or a storage carbohydrate reversibly converted to blood glucose and normally serves to maintain blood sugar level, when supply of carbohydrate from intestinal absorption is inadequate. Glycogen break down into glucose is governed by the extrinsic and intrinsic factors that govern the physiology of organism.

The carbohydrate metabolism essentially constitutes two segments: synthesis of carbohydrates which includes – glycogenesis and gluconeogenesis. While catabolic pathways include – glycolysis, glycogenolysis, pentose pathway, Kreb's cycle and electron transport system. The catabolic pathways not only fulfil the needs of energy demands but also supply the amphibolic intermediates and reduced nucleotides (NADPH), required for protein and lipid metabolism.

Carbohydrates play not only a structural role in the cell but may serve as a reservoir of chemical energy. The major function of carbohydrates is to serve as a fuel and provide energy for the metabolic processes of the animal. In this role total carbohydrate is utilized by the cell mainly in the form of glucose

(Harper, 1983). Carbohydrate metabolism is broadly divided into anaerobic segment or glycolysis which consists of breakdown of glycogen or glucose through Embden-Mayerhalf pathway and aerobic segment which consists of oxidation of acetyl-CoA to carbon dioxide and water through citric acid cycle. During the course of oxidation of acetyl-CoA in this cycle, reducing equivalents are formed which ten enter the respiratory chain, where high energy phosphate bonds are generated in the process of oxidative phsophorylation. The sequences involved in carbohydrate metabolism are well established in several crustaceans including crabs (Sreenivasulu Reddy, 1987). It is well known that organ phosphorous and or organochlorine insecticides are known to alter physiological and biochemical state of animals by inducing variations in the activities of several enzymes (Abidi, 1986). Disturbances in carbohydrate metabolism are a major biochemical lesion arising out of the action insecticides leading to compensatory shifts in overall metabolism (Ramakrishnan, 1973).

The effects of OC insectides on different aspects of carbohydrate metabolism of non-target species have been studied. Eller (1971) observed hyperplasia of the islets of Langerhans in the trout, *Salmoclarki* on exposure to Endrin suggesting changes in carbohydrate metabolism.Shaffi (1979) reported break down of liver, muscle, brain and kidney glycogen with resultant hyperglycemia and hyperlactemia in nine Indian fishes exposed to heptachlor. Rajendraprasad Naidu *et al.,* (1986) observed marked changes in the activities of LDH, ICDH, SDH, G-6-PDH, and phosphorylase, AAT, AIAT and GDH and in the concentrations of hepatopancreatic glycogen.

Endosulfan induced changes in the biochemical composition of the freshwater bivalve molluse, *L. marginalis* (Muley and Mane, 1989). RamanaRao and Ramamurthi (1980) have observed glycogen depletion in the hepatopancreas of the snail *P. globosa* after exposure to sumithion. Increased concentration of pyruvate and lactate were observed under organochlorine insecticides – dieldrin and telodrin, intoxication (Hathway, 1965). It has been reported that chronic and acute poisoning of sheep and chicken with organophosphate insecticides like thiophos, chlorophos and methylnitrophos is accompanied by profound changes in carbohydrate metabolism.

MATERIAL AND METHODS:

Glycogen content was determined according to Anthrone reagent method (Selfers *et al.,* 1956). Carbohydrates are first hydrolyses into simple sugar using dilute hydrochloric acid. In hot acidic medium glucose is dehydrated to hydroxyl methyl furfural. Compound forms with anthrone a green coloured product with an absorption maximum at 630 nm.

Weight 100 mg of sample into boiling tube. Hydrolyse by keeping it in boiling water bath for three hours with 5 ml neutralise it with solid sodium carbonate until the effervescence ceases. Make up the volume to 10 ml & centrifuge. Collect the supernatant and take 0.5 & 1 ml aliquots for analysis. Prepare the standard by take 0.5 & 1 ml aliquots for analysis. Prepare the Standards by taking 0, 0.2, 0.4, 0.6, 0.8 and 1 ml of the working Standard ‘0’ serve as blank. Make up the volume to 1 ml in all the tubes melding the sample tubes by adding distilled water. Then add 4 ml of anthrone reagent, Heat for eight minutes in boiling water bath. Cool rapidly and read the green to dark green colour at 630 nm. Draw a standard graph by plotting concentration of the standard on the X–axis versus absorbance on Y–axis. The Glycogen content was expressed as mg glycogen/gm. wet. Wt. of tissue.

RESULT AND DISCUSSION:

Changes due to the Effect of Endosulfan pesticide on the Glycogen content of leg muscle, gill muscle, hepatopancreas, heart muscle of Freshwater female crab*Barytelphusa Cunacularis*, after exposure to the concentration of Endosulfan for 24, 48, 72 and 96 hours, the values of Glycogen contents were expressed in term of mg glycogen/gm. wet, weight.

Table: Effect of Endosulfan on Glycogen contents inFreshwater Female Crab *Barytelphusa Cunacularis*

Sr. No.	Duration of Exposure	Muscle	Gill	Hepatopancreas	Heart
1.	Control	4.64 ± 0.014	5.21 ± 0.006	6.42 ± 0.031	4.45 ± 0.018
2.	24	3.70 ± 0.022*	5.11 ± 0.022**	4.92 ± 0.021***	5.57 ± 0.020***
3.	48	3.42 ± 0.033**	5.85 ± 0.027***	5.65 ± 0.027**	4.23 ± 0.015**
4.	72	3.34 ± 0.020*	4.65 ± 0.037**	5.80 ± 0.016***	3.92 ± 0.007***
5.	96	3.15 ± 0.013***	4.18 ± 0.015**	5.13 ± 0.018**	3.21 ± 0.024***

Note: 1) Values expressed as mg glycogen/gm wet, weight of animals.
2) Each value is mean of six observations ± S.D.
3) Value are significant at * = P<0.05, ** = P < 0.01, ***=P < 0.001 & NS – Not significant

Figure (a): Effect of Endosulfan on Glycogen Content in *Barytelphusa Cunacularis* (24 hrs.)(Each value is the mean of six observations ± S.D.)

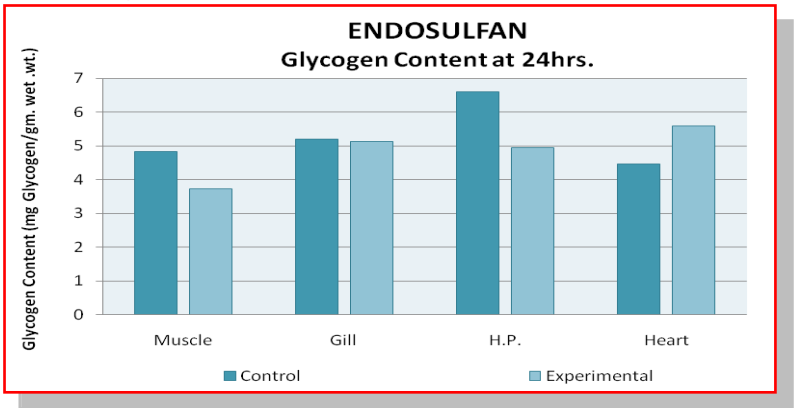


Figure (b): Effect of Endosulfan on Glycogen Content in *Barytelphusa Cunacularis* (48 hrs.)(Each value is the mean of six observations ± S.D.)

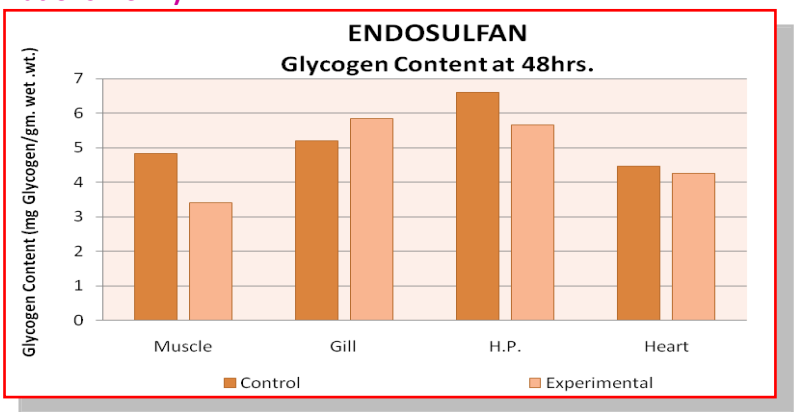


Figure (c): Effect of Endosulfan on Glycogen Content in *Barytelphusa Cunacularis* (72 hrs.)(Each value is the mean of six observations ± S.D.)

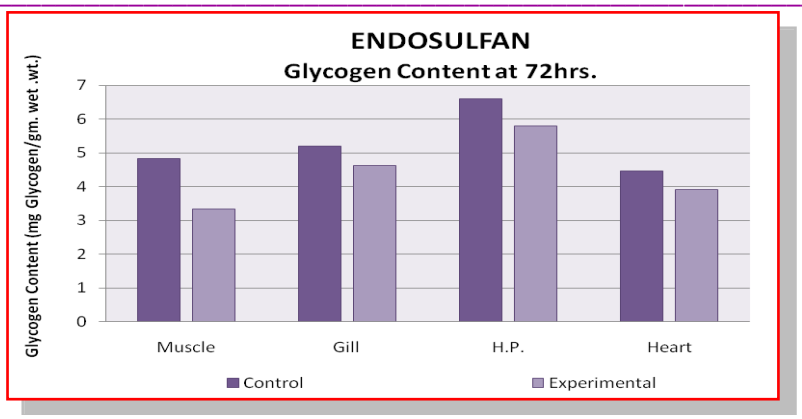
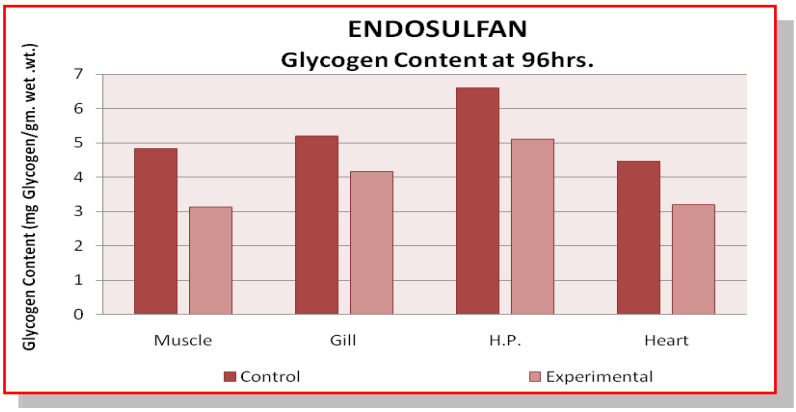


Figure (d): Effect of Endosulfan on Glycogen Content in *Barytelphusa Cunacularis* (96 hrs.)(Each value is the mean of six observations ± S.D.



The variation in the glycogen content due to exposure of pesticide pollutant given in aboveTable. The total glycogen contents expressed as mg/gm. wet. Weight in the tissue varied from 3.13 to 4.84 in leg muscle, 4.16 to 5.86 in gill muscle, 4.94 to 6.62 in Hepatopancreas and 3.20 to 5.59 in heart muscles of endosulfan exposed animals. The glycogen content initially increased in heart muscle at 24 hours and then decreased up to 96 hours, while in gill it increases at 48 hours. Decrease in leg muscle and Hepatopancreas upto 96 hours as compaired to control, shown in Table and graphically represented.

DISCUSSION:

The result shows the variation in the levels of organic reserves of various tissues. The carbohydrates are not only important as structural components but also serve as the source of energy. Excess of glucose store as a glycogen, a polysccharide stored in hepatopancreas in intertebrates and muscle and liver in vertebrates. The hepatopancreas of crustanceans in analogous to the liver of vertebrates and is involved in the synthesis and degradation of several molecules involved in the metabolism. (Chang &O'conor, 1983). It is utilised according to the need of the organism and so it suggest that carbohydrate are mainly used to meet higher energy demand to conbact the stress induced by heavy metals. When energy is required the glycogen is broken down and utilised as a source of energy.

In the preent probe when the freshwter female crab *Barytelphusa Cunacularis* were exposed to sublethalconcentraion of endosulfan which causes initial increase in glycogen level in heart muscle, but decrese in leg muscle and gill muscle and Hepatopancreas. But later on after longer exposure upto 96 hours, there was sharp decline in glycogen level in gill muscle, Hepatopancreas and heart muscle. In dimethoate exposed animals, there was gradual slight increase in glycogen level in hepatopanereas at 24 hours while slight decrease in glycogen level in leg muscle and heart muscle at 24 hours shown in Table. The observed depletion in glycogen content by pesticide pollutant. Several workers results on Crustacean species (NagabhushanamandKulkarni,1981), Pesticides (Rao and Nagabhushanam, 1987).

The decrease in glycogen level in hepatopancreas and muscle of freshwater Snail *Pilaglobose* exposed to endosulfan has been observed by Kulkarni*et al.,* (1984) observed a marked decline in tissue glycogen and carbohydrate level in the tissue of the crab *O. senexsenex* and explained that this might be due to the enhancement of glycogenolysis by increase in phosphorylase activity. Venkata Reddy observed a decline in the glycogen content in the gill, muscle and hepatopancreas of crab, *Oziotelphusasenexsenex* exposed to phosalone and suggested that it may be due to either a reduction in glycogenesis or increased glycogen utilisation through the glycolytic pathway.

The steady decrease in the tissue glycogen clearly indicates its rapid conversion by the respective tissues as a consequence of endosulfan intoxication. Depletion of glycogen would result in the disruption of enzymes associated with carbohydrate metabolism. Glycogen depletion is more prevalent under hypoxic conditions and it is quite likely that a situation similar to hypoxia might be occurring in the tissues of endosulfan exposed crab.

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