International Journal of Research Studies in Biosciences (IJRSB)
Volume 2, Issue 11, December 2014, PP 133-137
ISSN 2349-0357 (Print) & ISSN 2349-0365 (Online)
www.arcjournals.org

Increased Carbohydrate Metabolism in Freshwater Crab, *Barytelphusa Guerini* Exposed to Sumidon Stress, from Godavari Basin, Nanded, Maharashtra

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Abstract: *The fresh water male crab, Barytelphusa guerini was selected for experimentation. The crabs are available in the paddy fields of Nanded district. The animals were collected and brought to the laboratory for acclimatization. The animals were subjected to sub-lethal concentration of pollutant stress. The effect of pollutant i.e. Sumidon on the glycogen contents in the in different tissues of fresh water male crab was studied. The freshwater crabs were subjected to sub-lethal concentration of Sumidon (1.2 ppm) at 0, 24, 48, 72 and 96 hours after regular intervals. The amount of glycogen content on hepatopancreas of freshwater male crab was found to be decreased as compared to control set experimental animals. The deceasing trend of glycogen content was found to be increased in freshwater crab up to 96 hrs period of exposure. The results were Plotted and discussed in details.*

Keywords: *Barytelphusa guerini, Sumidon, Hepatopancreas, Total Glycogen.*

1. INTRODUCTION

The extensive uses of pesticides have been used all over the world to control insects, pests and disease vectors. They ultimately find their way into aquatic habitats such as lakes, rivers and ponds. They are highly toxic which contribute substantially to the food chain (Sakr & Jamul, 2005). The effect of pesticides, organic and inorganic matter on aquatic animals have major contribution for the chemical contamination of environment. The chemical nature of most pesticides and fertilizers results in their accumulation and retention in nature. This will occur in both the plants and animals as well as environment itself. The widely used pesticides today for insect control such as organophosphates, methylcarbamates and pyrethroids. These pesticides are used to control the pests of economically important crops. The use of pesticides, fungicides, herbicides etc. used in agriculture causes diseases of animals and human beings (Tomizawa & Casida, 2005; Saeed et al, 2005). The use of biologically active pesticide like sumidon is used in plant protection. The excess use of such pesticides causes the life of aquatic animals in threat. The use of pesticides is widely distributed in the environment. They pose a critical stress on the aquatic biota, like crabs. The effect of different chemicals present in these pesticides varies which affects on various body tissues. The effect of pollutants on different tissues causes architectural changes. This leads to either the death of organisms or they make the organisms less labile for its survival (Koteswara Rao, 2003; Suneetha, 2012).

The crabs are economically important as they are used as a food source which fulfills the human need of food to some extent in our country. But since last decade, their natural environment is being disturbed due to the pollution. The increasing population density, faster urbanization and industrial growth has increased the complexity of pollution and led to deterioration of environment. (Salunk et al. 1982).

Carbohydrates are considered to be the first among the organic nutrients to be utilized to generate required energy (Heath, 1987). They serve as precursors for the dispensable amino acids and some nutrients, which are metabolic intermediates necessary for growth (NRC, 1993). The susceptibility of animal tissue to different chemical agents may vary from animal to animals and also within the same animal among the different tissues of the individual animals. The freshwater crab Barytelphusa guerini are regarded as indicator organism and are a potential biological tool for assessing the health of a particular ecosystem. Hence the attempt was made to study the effect of pollutant i.e. Sumidon on the glycogen contents in fresh water crab Barytelphusa guerini.

2. MATERIALS AND METHODS

The freshwater male crab, Barytelphusa guerini used for experimentation. The species is available abundantly in the paddy fields of Nanded district, Maharashtra. The crabs were maintained in the glass aquarium jars, fed with goat meat and acclimatized to the laboratory conditions. The freshwater male crabs, Barytelphysa guerini (weighing between 35 to 50 gms) were subjected to one sub-lethal concentration of 1.2 ppm of Sumidon up to 96 hours period of exposure. Only healthy crabs were selected for the present study (Ambore, 1976).

The animals under stressed state were exposed to sub-lethal concentration of sumidon for 0, 24, 48, 72 and 96 hrs period of exposure. The estimation of glycogen content was done by the method of Anthrone (Seifer S. et. al., 1950) using glucose powder as the standard. The values were calculated from standard graph of glucose. The same procedure was repeated for six readings under each observation. The obtained results were compared with the animals maintained in the control set. The obtained values are plotted in graph and discussed in detail.

The total polysaccharides (glycogen) expressed as mg/gm wet wt. of tissue.

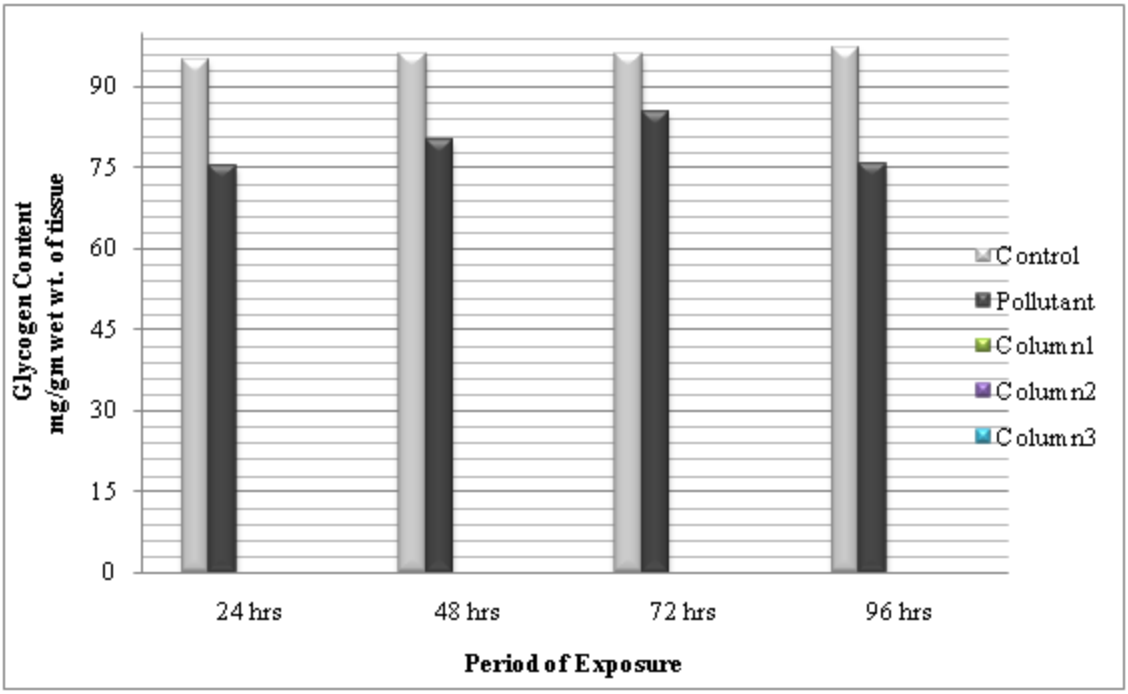
3. RESULTS

The freshwater male crab, Barytelphusa guerini exposed to sub-lethal concentration of Sumidon as a toxicant showed remarkable changes in glycogen content in hepatopancreas. The values obtained for total glycogen content for experimental crabs for 24 hrs, 48 hrs, 72 hrs and 96 hrs period of exposure were found to be 75.27, 80.22, 85.25 and 75.58 mg/gm wet wt. of tissue respectively. The glycogen content in hepatopancreas of fresh water male crab, Barytelphusa guerini was found to be suddenly decreased at 24 hrs period of exposure as compared to control set. The decreasing trend was observed in hepatopancreas of freshwater male crab, Barytelphusa guerini. The deceased glycogen content at 24 hours was found to be increased slightly up to 96 period of exposure. The values obtained for control set were found to be 95.12, 96.16, 96.18 and 97.26 mg/gm wet wt. of tissue for 24, 48, 72 & 96 hours period of exposure respectively.

Table1. *Effect of Sumidon on Total Glycogen Content in Freshwater Male Crab, Barytelphusa guerini for 24, 48, 72 & 96 hours period of exposure*

Sr. No	Exposure Period	Total Glycogen Content (mg/gm wet wt of tissue) (Control Set)	Total Glycogen Content (mg/gm wet wt of tissue) (Experimental Set)
1	24 hrs	95.12 ± 0.35	75.27 ± 0.24
	48 hrs	96.16 ± 0.10	80.22 ± 0.12
	72 hrs	96.18 ± 0.14	85.25 ± 0.52
	96 hrs	97.26 ± 0.52	75.58 ± 0.12

Graph. *Effect of Sumidon on Total Glycogen Content in Hepatopancreas of Fresh Water Male Crab, Barytelphusa guerini in Control and Experimental Set for 24, 48, 72 & 96 hours period of exposure*



(Each Value is Mean of Five Observations ± S. D.)

4. DISCUSSION

Aquatic ecosystems that run through agricultural areas have high probability of being contaminated by runoff and groundwater leaching by a variety of chemicals. Highly effective pesticides are used tremendously, which on entering the aquatic environment bring multiple changes in organism (Ramesh et.al., 2008). The aquatic ecosystem is the greater part of the natural environment, which is facing the threat of shrinking genetic base and biodiversity due to indiscriminate use of pesticides (Rahman et al, 2002).

The pollution of water resources are occurred due to human activity. The contamination of water, change in temperature, physical, chemical or biological characteristics of the water are changed. Therefore its environmental value is demonstrably depreciated. The aquatic animals are susceptible to such various pollutants, but they have to adjust to these new circumstances by changing their metabolic activities.

The study of the impact of pesticides on aquatic animals is an important aspect of chemical contamination of the aquatic environment by some of the heavy metals. Heavy metals discharged into water resources cause hazardous effects on aquatic life (Kaviraj, 1983 a and b). In many pesticides, heavy metals have been extensively used and they are vigorously utilized in agricultural operation now days. The incorporation of these heavy metals in lower organisms have been recorded to cause serious morphological alternations in vital tissues even at the very low concentrations. The toxicity of toxicants is acute or chronic. The extent of severity of tissue damage is a consequence of the concentration of the toxicant and is time dependent. The severity of damage depends on the toxic potentiality of a particular compound or pesticide accumulated in the tissue (Korkmaz et al 2009). The toxicants have various physiological effects as well as inhibitory effects on growth, food intake, metabolism and general development of animal (Tungare and Sawant, 2000).

During the physiological stress condition there is greater energy demand for performing enhanced metabolic activities. In the body of animals sources of energy are carbohydrates, proteins and fat. The obtained experimental results were compared with the animals in control set. The present research shows depletion of carbohydrate i.e. total glycogen content was observed in the hepatopancreas of the freshwater male crab, *Barytelphysa guerini*, when exposed to Sumidon.

Earlier findings have also reported the elevated blood glucose and decreased tissues glycogen in fish *Cyprinus carpio* exposed to other organophosphate compounds (Sukaguchi and Hamaguchi, 1975). Carbohydrates are stored in the hepatic tissues in the form of glycogen and whenever energy is required the glycogen smashed up into glucose and utilized as a source of energy to overcome stress condition induced by insecticides. Glycogen content therefore decreases and an increase in the level of total sugar in the tissues generally occurs. Kulkarni *et al.*, (1983) observed a decrease in glycogen and total sugar content in the selected tissues of freshwater crab, *Barytelphusa guerini*, after exposure to sublethal concentration of Hildan. Similar results were noted by effect of inorganic pollutants on the physiology of freshwater crab, Barytelphusa guerini (Mali et.al. 2002).

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