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EFFECT OF POTASSIUM PERMANGANATES ON GLYCOGEN LEVELS IN THE FRESH WATER FISH, *LABEO ROHITA*

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ABSTRACT The effect on extreme exposure of potassium permanganate in various tissues of fresh water fish, *Labeo rohita* was studied. The average LC_{50} values were determined for 24 hrs, 48 hrs, 72 hrs and 96 hrs and the fishes were exposed to the sub lethal concentration of $KmNO_4$. For the present work the tissues selected were gills and muscles. The glycogen level in all the tissues was found to be declined on exposure of crabs to $KmNO_4$. Under normal physiological condition extra glucose is stored in the form of glycogen in tissues of fishes and glycogenolysis, in turn, makes the glucose readily available for utilization of energy through Common Metabolic Pathways as per the requirement of animals. The decreasing rate of glycogen was found to be same in all tissues viz., gills and muscles.

KEYWORDS : *Labeo rohita*, Total Glycogen, Potassium Permanganate.

Introduction

Carbohydrates are the most useful and inexpensive source of energy for fishes. Glycogen is the primary source in exercising fishes Glycogen has been postulated as the important source, it is useful for production of energy.

The physiological status of an animal gives an idea about the normal functional state or when the animal in adverse condition. The changes in environmental situation disrupts the normal functioning of animals. The changes in physiological status of an animal also denote biochemical alterations occurred within the body of animal. To counteract the stress condition an animal require extra energy to overcome the stress induced alterations. The instant source of energy i.e. glycogen is stored in animal body as emergency storage of chemical energy (Yeragi, et.al., 2000).

The main aim of this study is to find out the effect of $KmNO_4$ on glycogen content in the freshwater fish, *Labeo rohita*. The biological concept of stress applied to animals has attracted considerable attention in last few years. Stress is a generalized response attributed to the fact that animal commonly has a complex of adaptive reactions to cope with stressors (Bonga, 1997).

Material and Methods:

The experimental animals (fresh water fish, *Labeo rohita)* were available abundantly in the Godavari river at Nanded District, Maharashtra. They were acclimated in the laboratory situation 2-4 days prior to experimentation during which they were maintained in large aquaria. The fishes were maintained in the glass aquarium , fed with fish food and acclimatized to the laboratory conditions. Dead fishes were removed. Only healthy, active and moderate size fishes were selected for the present experimentation . Experimental fishes were not fed one day before the commencement of experiment in order to avoid the difference, if any, due to differential feeding.

To analyze the LC_{50} value, the fishes were exposed to (0.1 gm/L) concentration of $KmNO_4$ for 24, 48 72 and 96 period of exposure. The static method is used to run the experiment of toxicity evaluation upon 96 hrs as described by Finney, 1971. The bioassay experiment was repeated with control group of animals and mortality was recorded at the end of 96 hrs. No mortality was observed in control group of animals. Similarly fishes were exposed to sub lethal concentration (0.05 gm/L) of $KmNO_4$ exposed up the period of 96 hours. The glycogen contents were estimated in the different tissues of fresh water fish, *Labeo rohita i.e.* muscles and gills. The estimation of Glycogen concentration was done by the method of Anthrone (Seifer S. et. al., 1950) using glucose powder as the standard. The values for total glycogen content in fish *Labeo rohita* expressed as mg glycogen/gm wet weight of the tissue. The obtained data were statistically analyzed and plotted in the table1 and graphically (1.1, 1.2 & 1.3) given below.

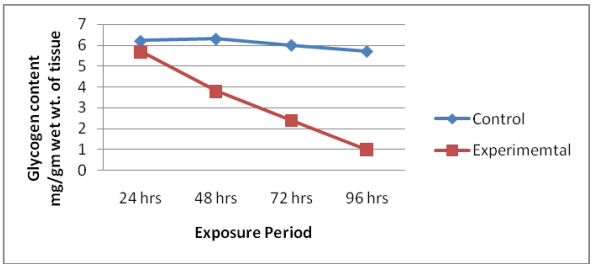
The total polysaccharides (glycogen) expressed as mg/gm wet wt. of tissue.

Table 1: Effect of Potassium Permanganate on Total Glycogen Content of Fresh Water fish, *Labeo rohita*

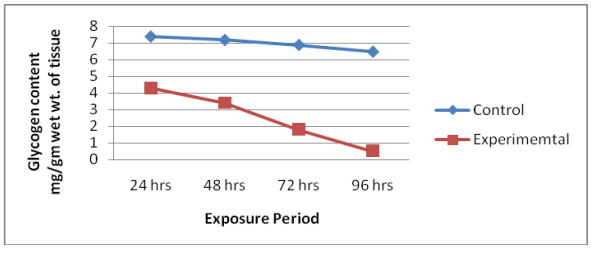
Sr. No	Name of Tissue	Exposure Period	Glycogen Content (mg/0.1 gm wet wt of tissue) (Control Set)	Glycogen Content (mg/0.1 gm wet wt of tissue) (Experimental Set)
1	Muscle	24 hrs	6.2 ± 0.65	5.7 ± 0.44
		48 hrs	6.3 ± 0.76	3.8 ± 0.26
		72 hrs	6.0 ± 0.44	2.4 ± 0.65
		96 hrs	5.7 ± 0.33	1.0 ± 0.35
2	Gills	24 hrs	7.4 ± 0.28	4.3 ± 0.67
		48 hrs	7.2 ± 0.81	3.4 ± 0.66
		72 hrs	6.9 ± 0.82	1.8 ± 0.22
		96 hrs	6.5 ± 0.43	0.5 ± 0.26

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

Graph1.1: Effect of Potassium Permanganate on Total Glycogen Content in Muscle of Fresh Water Fish, *Labeo rohita*



Graph 1.2: Effect of Potassium Permanganate on Total Glycogen Content in Gills of Fresh Water Fish, *Labeo rohita*



Results

The freshwater Fish, *Labeo rohia* exposed to sub-lethal concentration of $KmNO_4$ as a toxicant showed notable changes in total glycogen contents in different tissues. The glycogen contents in muscle of fresh water fish, *Labeo rohita* was found to be suddenly declined up to 96 hrs period of exposure as compared to control set. The glycogen content in control set for 24 to 96 period of exposure was found to be 6.2, 6.3, 6.0 and 5.7 mg/gm wet weight of muscle respectively. The values obtained for treated set at 24 hrs, 48 hrs, 72 hrs and 96 hrs period of exposure were found to be 5.7, 3.8, 2.4 and 1.0 mg/gm wet wt. of muscle respectively.

The amount of glycogen content was also found to be decreased in gills of fresh water fish, *Labeo rohita* was found to be suddenly decreased up to 96 hrs period of exposure as compared to control set. The values for control set up to 96 hours period of exposure were found to be 7.4, 7.2, 6.9 and 6.5 mg/gm wet weight of gills respectively. The values obtained for experimental set for 24 hrs, 48 hrs, 72 hrs and 96 hrs period of exposure were 4.3, 3.4, 1.8 and 0.5 mg/gm wet wt. of gills respectively.

Discussion:

Every living organisms composed of basic, structural, functional fundamental unit called cell. They need energy for active mechanism. They take energy by the breakdown of carbohydrate molecules i.e. glucose for oxidation in which enzymes participated as biocatalyst. All the cells perform various activities and having basic biomolecules.

Glycogen is a common polysaccharide accumulated in liver and muscle in animals. It is the storage form of glucose in the animals, humans which is similar to the starch in plants. Glycogen along with other carbohydrates is the major group of biomolecules in the body. They perform the functions as energy fuels, structural constituents and informational molecules. The carbohydrates perform various functions in which glucose maintain blood sugar level and glycogen is the major energy source in the body of animals. They 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).

Carbohydrates are considered to be the first metabolites degraded under stressed condition. In present work it was found that the $KmNO_4$ stress causes decline in glycogen content in all tissues. On exposure to *Perna indica* under hypoxic condition increase in carbohydrate utilisation for energy leads to the decline in stored polysaccharides in stress condition. Under stress situation the animal exhibits rapid movements as an avoidance response which is related with the in the inclined respiratory metabolism. Thus accelerate in energy demand against stress condition leads to the depletion of tissue glycogen in all tissues (Dezwaan et.al, 1972). Similar observation were reported by Lomte, 1982 in Prosobranch snail, *Belamia bengalensis.*

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