ORIGINAL RESEARCH PAPER

Volume-7 | Issue-3 | March-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EFFECTS OF SUB LETHAL CONCENTRATIONS OF POTASSIUM PERMANGANATE ON PROTEIN CONTENT OF FRESHWATER FISH: *CATLA CATLA*

Zoology

Dipti V. Totawar Research and P.G. Department of Zoology N.E.S. Science College, Nanded-431602(M.S)

ABSTRACT

The effect of $KMnO_4$ on protein content in different tissues of fresh water fish, *Catla catla* was studied by using Lowry's Method (1951). The animals were exposed to acute exposure of the $KMnO_4$ for the present study. The protein content in tissues such as gills, and muscles were observed. The protein levels in all the tissues were found to be decline on exposure to potassium permanganate ($KMnO_4$) under normal physiological condition excess of protein is stored in the tissues like and muscles in tissues of fish for common metabolic pathways. As per the requirement of animals it is utilized. On exposure to $KMnO_4$ the magnitude of protein content was found to be directly linked to the duration of exposure.

KEYWORDS

Catla catla, Protein, Potassium Permanganate ($KMnO_4$).

Introduction

Now a day's pollution in water bodies due to toxic substances in ecosystem show levels above the expected background. The chemical nature of most pesticides and fertilizers results in their aggregation and retention in nature. This will occur in the plants and animals as well as environment .

In the various metabolic reaction energy is made available to perform mechanical work and chemical work such as formation of carbohydrates, proteins and lipids (McDonald et.al, 1989). Biochemical analysis is an index of nutritive value only because the fractions it isolates correlated with some of the properties of organisms possesses nutritionally significant value (Kamal et. al, 2007).

Proteins are acquires vital importance to the survival of living organisms. They are produced in the cell. They form large part of the structure of cells and are present in all tissues. They play important role in physiological functions like structural components of cell membranes enzymes, proteins, hormones, nucleoproteins and antibodies (Albert Lehninger *et al.*).

Material and Methods:

The animals used for experimental work was the fresh water fish, *Catla catla*. The species is available abundantly in Godavari river in Nanded District, Maharashtra. They were acclimated in the laboratory conditions for a week prior the bioassay tests during which they were maintained in large aquaria.Only healthy, active and moderate size animals weighed between 35-40 gm were initiation of experiment in order to avoid the difference, if any, due to differential feeding.

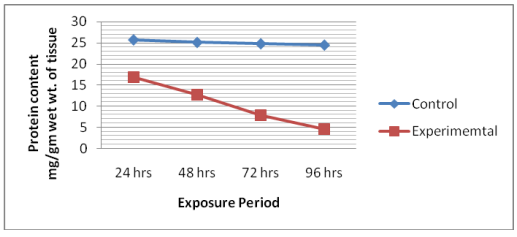
To determine the LC_{50} value, the fishes were exposed to (0.1 gm/L) concentration of potassium permanganate for 24, 48, 72 and 96 period of exposure. The statistic method is used to run the experiment of toxicity evaluation upon 96 hrs as described by Finney, 1971. The bioassay experiment was repeated with control group of fishes and mortality was recorded at the end of 96 hrs. No mortality was observed in control group of fishes. Similarly fishes were exposed to sub lethal concentration (0.05 gm/L) of $KMnO_4$ exposed up the period of 96 hours. The protein contents were analyzed in the various tissues of fresh water fish, *Catla catla i.e.* muscles and gills. The estimation of protein content was done by the of Lowry et.al, (1951) method; using crystalline bovine serum albumin (BSA) as the standard. The values for total protein content in fish *Catla catla*, expressed as mg protein/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.

Table 1: Effect of Potassium Permanganate on Total Protein Content of Fresh Water fish, *Catla catla*

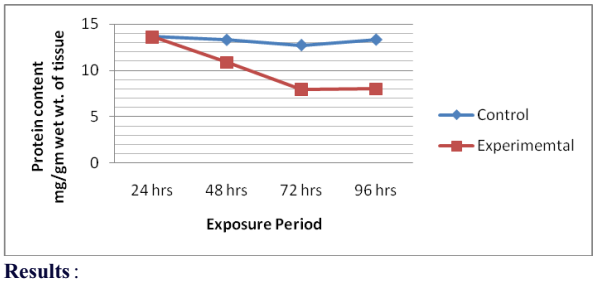
Sr. No	Name of Tissue	Exposure Period	Protein Content (mg/gm wet wt of tissue) (Control Set)	Protein Content (mg/gm wet wt of tissue) (Experimental Set)
1	Muscle	24 hrs	25.75 ± 1.65	16.96 ± 0.74
		48 hrs	25.15 ± 0.86	12.72 ± 0.16
		72 hrs	24.84 ± 0.04	07.87 ± 0.45
		96 hrs	24.54 ± 0.54	04.54 ± 0.15
2	Gills	24 hrs	13.63 ± 0.48	13.63 ± 0.76
		48 hrs	13.30 ± 0.91	10.90 ± 0.66
		72 hrs	12.72 ± 0.82	07.96 ± 0.25
		96 hrs	13.33 ± 0.33	08.03 ± 0.22

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

Graph1.1: Effect of Potassium Permanganate on Protein Content in Muscle of Fresh Water fish *Catla catla*



Graph 1.2: Effect of Potassium Permanganate on Protein Content in Gills of Fresh Water fish, *Catla catla*



Results :

The freshwater fish, *Catla catla* exposed to sub-lethal concentration of potassium permanganate as a toxicant showed notable changes in protein contents in various tissues. The protein contents in muscle of fresh water fish, *Catla catla* was found to be suddenly declined up to 96 hrs of exposure as compared to control set. The protein content in control set for 24 to 96 period of exposure was found to be 25.75, 25.15, 24.84 and 24.54 mg/gm wet weight of muscle respectively. The values get for protein content for treated crabs for 24 hrs, 48 hrs, 72 hrs and 96 hrs period of exposure were found to be 16.96, 12.72, 7.87 1nd 4.54 mg/gm wet wt. of muscle respectively.

The level of protein contents in gills of fresh water fish, *Catla catla* was found to be suddenly decreased up to 96 hrs period of exposure as compared to control set. The amount of protein content for control set at 24, 48, 72 and 96 hours period of exposure was found to be 13.63, 13.30, 12.74 and 13.33 mg/gm wet weight of Gills respectively. The values obtained for treated set for 24 hrs, 48 hrs, 72 hrs and 96 hrs period of exposure were 13.63, 10.90, 7.96, and 8.03 mg/gm wet wt. of gills respectively.

Discussion:

Rate of protein metabolism in muscle may be slower than in the liver, the mass of muscles so much increase that of other tissues that it makes this tissue also quantitatively the most vital site of protein synthesis.

Also, much of the catabolism of amino acids take place in the muscle (Hepher, 1988).

The pollutant in the form of industrial effluents directly mixes in the water of streams and rivers. There by polluting the water in different ways. These wastes are very dangerous to the life of aquatic life. These non biodegradable substances aggregate in the bio system. These toxicants cause pollution which cannot be easily removed by oxidation, precipitation or other processes and affects the activity of the animals (Mukke et.al, 2012 ;Bharathi et.al, 2002).

Under stress situation the changes in biochemical parameters occurs where extra energy is required. The loss of energy in the animal body fulfilled from the stored depots in the form of protein, glycogen and fat in various tissues. The biochemical composition in treated animals alters according to situation like environmental factors, starvation, toxicants etc. The Pisces resist against stress situation by their own way and try to decrease the effect of this changed condition by removing the toxicant. The level of carbohydrate, protein and fat gives proper idea of the stress. To overcome form this problem the present investigation tries to fulfill the gap on the fish, *Catla catla*. Therefore the analysis of protein can be considered as a diagnostic tool to determine physical phases of organism.

Proteins play an vital role in cell metabolism. All enzymes and hormones are made up of protein and involved in the metabolic activities. The total protein content in the muscle and gill were found to decreased in the sub-lethal concentration of potassium permanganate. Kumar *et al.* (2012) reported that sodium arsenide decreased in the concentration of protein in catfish *Clarius batractus.* To elevate the level of repair, the proteolytic action increase, resulting decreased of protein contents (Kabeer *et al.*, 1977). More, (2012) .From the present investigation it can be concluded that potassium permanganate at sub-lethal concentration induced energy demand in the whole body tissue and the fish try to withstand the toxic stress imposed at the cellular level by operating some sort of regulatory pathway.

The impairment in protein synthesis, the declined in total average protein content of tissue alter treatment suggest increase of proteolysis to meet the high energy demand under pesticidal stress (Kabeer, 1978). The decrease in protein level during pollutant exposure may be due to increased in protein catabolism and decreased anabolism of protein. Shariff (1987) studied the effect of detergent on biochemical constituent and found decline of protein content and concluded that the decrease may be due to enhanced activity of proteolytic enzymes.

References:

1. Albert Lehninger, L., David L. Nelson and Michael M. Cox, Principles of Biochemistry, pp. 1054
2. Finney, D. J. (1971): Probit Analysis, 3rd, Cambridge University press, London. 25-66.
3. Hepher, B. (1988): Principles of fish nutrition. In: Fish Culture in Warm water systems, Problems & Trends (Shilo, M. & Sarig, S. eds), pp. 121–142. CRC Press, New York, USA.
4. Kabeer Ahmed (1978): Effect of Malathion on free amino acids of total protein, Glycogen & some enzymes of Pelecypods – Lamellides marginalis. Proceedings of Ind. Read Soci. B. 87 (12), pp. 377 – 380.
5. Kamal D., A. N. Khan, M. A. Rahman and F. Ahamed (2007): Biochemical composition of some small indigenous freshwater fishes from the River Mouri, Khulna, Bangladesh, Pakistan Journal of Biological Sciences, Vol. 10 (9), pp. 1559-1561
6. Kumar, Randhir and Banerjee, Tarun (2012): Study of sodium arsenate induced biochemical changes on certain biomolecules of the fresh water catfish Clarius batrachus, Neutropical Ichthyol., 10 (20): 451-459.
7. Lowry, O. H., Rosenbrough, N. J., Farr, A.L. and Smith, F. (1956): Protein measurement with folin-phenol reagent. J. Bio. Chem., 193: 265 175.
8. MacDonald, N. L., R. J. Stark and M. Keith (1989): Digestion and nutrition in the prawn, Penaeus monodon. Journal World Aquaculture Soc. 20:53A.
9. Shariff (1987): Modulation in the Biochemical nature of the body mussels of a fresh water teleost Saropherodon mossambicus (Peters) due to DETOL (A) (Synthetic detergent), Proceedings of National Conference on Environment Impact on Bio system, pp. 279 – 282.