RESEARCH PAPER

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Study of carbohydrate metabolism in selected tissues of fresh water bivalves, *(Lamellidens marginalis)* under copper sulphate toxicity

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Sub-lethal toxicity of copper sulphate on carbohydrate metabolism was studied in selected tissues of freshwater mussel *(Lamellidens marginalis)* Levels of glycogen decreased up to 96 hours due to toxic effect of copper sulphate.

Key words : Copper Sulphate Toxicity, Carbohydrate Metabolism, Glycogen, *Lamellidens marginalis*

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INTRODUCTION

Toxic influence of metals produces physiological changes in organs of animal. Industrial effluents contributing to aquatic pollution contain a vast array of toxic substances which include heavy metals. Indiscriminate discharges of these wastes alter the quality of water and cause hazards to flora and fauna. Copper is a micronutrient and is present as a metal ion in certain enzymes and plays an important role in the transfer of electrons in electron transport chain. It is a component of haemocyanin, the respiratory pigment of molluses. However, at high concentrations it is toxic to organisms and occupies third place in the order of metal toxicity (Waldichuk, 1974). Reports are available in fishes on the toxicity of copper on oxygen consumption (Sultana and Uma Devi1995). It is also shown to inhibit oxygen consumption in bivalves (Sultana and Lomte, 1998) and carbohydrate levels in snails (Ramalingam and Indra 2002). There is a lot of information available on the effect of copper on carbohydrate metabolism in bivalves. Bivalves circulate large amounts of water through their bodies to obtain oxygen and food by ciliary mode of feeding. They are known to accumulate metal ions from the surrounding environment to a very high level relative to the concentration of water (Nambison *et al.,* 1977). Present work deals with the toxicity of copper on carbohydrate metabolism in selected tissues of a fresh water bivalve (*Lamellidens marginalis)*.

RESEARCH METHODOLOGY

The freshwater mussels were obtained from Godavari River, Nanded, Dist. Nanded (M.S.). The animals were maintained in laboratory in small aquariums with aerators and allowed to acclimatize for about 4-5 days. To obtain LC_{50} value, the animals were exposed to different concentrations of copper sulphate for 96 hrs and the value was determined by the method of Finney (1952). The LC_{50} value obtained was 3.99 mg/l and 1.33 mg/l was considered as sub lethal.

The mussels were exposed to sub lethal concentration of copper for 96 hr. After the exposure, the animals were sacrificed and the tissue *viz*., gill, foot and mantle were isolated and processed for estimation. Tissues in experimental and control set of bivalves were isolated and dried in oven, used for estimation of glycogen. Glycogen content in different tissues was estimated by using Anthrone Method (Seifer.*et.al.,* 1950).

RESULTS AND ANALYSIS

The concentration of glycogen levels in different tissues of fresh water bivalves is presented in the Table 1. The animals were exposed to different periods *i.e.* 24,

Table 1 : showing the changes observed in glycogen content of different tissues of bivalve (*Lamellidens marginalis)* after exposed to copper sulphate toxicity

Sr.No.	Exposure period	Gills		Mantle		Foot		Adductor muscles	
		C	T	C	T	C	T	C	T
1.	24	20.04	10.79	112.59	68.31	15.34	8.78	18.77	9.78
		± 2.73	±2.50	± 5.91	± 5.99	± 2.22	± 2.25	± 2.45	± 2.25
2.	48	20.01	10.53	112.30	60.01	15.30	8.77	18.76	9.77
		± 2.71	± 2.54	± 5.81	± 5.98	± 2.21	± 2.24	± 2.44	±2.24
3.	72	19.79	09.56	112.76	54.33	14.50	8.79	17.75	9.795
		± 2.69	± 2.45	± 5.80	± 5.90	± 2.20	± 2.23	± 2.42	±2.23
4.	96	19.84	09.34	112.14	50.21	14.44	8.75	17.75	9.72
		± 2.70	± 2.56	± 5.79	± 5.92	± 2.19	± 2.22	± 2.43	±2.22

Each reading is a mean of six observations ± S. D., C= Control, T= Treated

48, 72 and 96 hours. The level of glycogen contents was found to be decreased in all tissues such as gills, mantle, foot and hepatopancreas of fresh water bivalve *Lamellidens marginalis* due to the effect of copper sulphate toxicity. Glycogen content in gill of fresh water bivalve *Lamellidens marginalis* in controlled set from 24 hours to 96 hours was 20.04 to 19.84 and that of experimental set was 10.79 to 09.34, in mantle for control set 112.59 to 112.14 and for experimental set was 68.31 to 50.21, in foot for control set 15.34 to 14.44 and for experimental set was 8.78 to 8.75.

The decrease in glycogen content was observed in different tissues of fresh water bivalve from 24 hours to 96 hours period. It is due to the diversion of end product of glycolysis (pyruvates) for aerobic reaction of Krebs cycle which results in depletion of NAD due to continuation of glycolysis under anaerobic conditions pyruvate is reduced to lactate and lactate oxidation is inhibited so as to supply NAD^+ for glyceraldehydes-3-phosphate dehydrogenase activity due to this the glycogen content is found to be decreased (Satyaparmeshwar *et. al.,* 2006). The glycogen content in fresh water bivalves is found to be high (de Zwaan, 1983) and in mantle it stores high quantity (Narayan *et al.,* 1979). Decrease in glycogen content in fresh water animals is studied by Shaffi, (1978) under exposure to copper sulphate toxication in fish. The same results were observed by (Sultana and Lomte, 1998).

LITERATURE CITED

De Zwaan, A. (1983). Carbohydrate catabolism in bivalves. In: *The physiology of mollusca* (Ed.: P. W. Hochachka), Acad. Press, New York. pp. 138-175.

Finney, D. J. (1952). *Probit analysis 2nd ed.* Cambridge University Press, Cambridge, England.

Nambison, K. P. N., Lakshmanan, P. T. and Mohammed Salih, K. Y. (1977). On the uptake of copper (II) by *Meretrix casta* (Cheminitz) an indicator species of metal pollution. *Curr. Sci.,* **46** (13): 437-440.

Narayan, G., Rahman Khan, M., Vijay Kumar, N. and Chari, N. (1979). Metabolic differentiation of mantle and foot in fresh water mussel, *Lamellidens marginalis*. *Comp. Physiol. Ecol.,* **4**: 128-130.

Ramalingam, K. and Indra, D. (2002). Copper sulphate (CuS04) toxicity on tissue phosphatases and carbohydrate turnover in *Achatina fulcia*. *J. Environ. Biol.,* **23**(2): 181-188.

Satyaparmeshwar, K., Ravinder Reddy, T. and Vijaya kumar N., (2006). Study of carbohydrate metabolism in selected tissues of fresh water mussel, *Lamellidens marginalis* under copper sulphate toxicity. *J. Environ Biol.*,**27**(1): 39-41.

Seifer S., Dayton S., Navic B. and Muntwy G. R. (1950). The estimation of glycogen with anthrone reagent .*Arch. Biochem. Biophys.***25** (1) : 191-200 .

Sultana, M. and Lomte V. S. (1998). Metabolic depression in the freshwater bivalve *(Lamellidens marginalis)* exposed to mercuric chloride and copper sulphate. *Indian J. Comp. Anim. Physiol.,* **16**: 28-30.

Sultana, R. and Uma Devi, V. (1995). Oxygen consumption in a cat fish, *Mystus gulio* (Ham.) exposed to heavy metals. *J. Environ Biol.,* **16**(3): 207-210.

Waldichuk, M. (1974). Some biological concerns in heavy metal pollution. In: *Pollution and physiology of marine organisms*. Academic Press, New York.pp. 1 – 57.

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