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TISSUE GLYCOGEN LEVEL IN DIFFERENT BODY PARTS OF THE GREEN MUSSELS, *PERNA VIRIDIS* EXPOSED TO ZINC CHLORIDES IN SUMMER SEASON

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Green mussels *Perna viridis* (shell length 80-90 mm) from Bhatye creek, Ratnagiri in summer were exposed to $ZnCl_2$ of 0.2 ppm and 0.4 ppm ($1/10^{th}$ LC_0 and LC_{50})for 7 days, 7 days laboratory depuration and 7 days field depuration. The glycogen content in 0.2 ppm and 0.4 ppm exposed (7 days) showed increased level in gill, hepatopancreas and adductor muscles while 7 days laboratory depurated 0.2 ppm group of animal showed increase in gill, hepatopancreas adductor muscles and 0.4 ppm group of animal in adductor muscle, gill, hepatopancreas, siphon. The content in 7 days field depurated 0.2 ppm group of animals showed increase in mantle, hepatopancreas, siphon and adductor muscles while 0.4 ppm group of animal showed increase in hepatopancreas, siphon and adductor muscles. The results of the study are discussed in the light of zinc impact on the tissues of mussels.

INTRODUCTION

Food is an important source of energy for all living organisms. Food energy is used for building up of body tissues, which further signifies that a balance diet is necessary for proper functioning of the body. Recent understanding of different biochemical processes has proved useful for determining the mechanism of toxicity in different toxicants, also in unfolding the adaptive and protective mechanism of the body to combat the toxic effect of the pollutants, besides it is also observed that some biochemical alteration occurring in the body give the first indication of stress in the organism and hence the efforts on the part of the pollution biologists to explore the possibility of making use of the phenomenon to locate certain type of pollutants in nature.

The introduction of small amounts of many relative toxic materials in an aquatic environment cause multiple changes in the internal dynamics of aquatic organism at sub-lethal levels. In aquatic toxicology, extensive literature is available on effects of various pollutants on the biochemical composition of tissue of different types of marine bivalve (Brayan *et al.*, 1978; Mc Greer, 1979; Jacobson *et al.*, Issac Mohan Raj *et al.*, 1991; Regoli *et al.*, 1991 & 1992; Bhargava *et. al.*, 1992; Bebianno *et al.*, 1993; Kumarswamy, *et al.*, 1999).

MATERIALS AND METHODS

The *P. viridis* were collected from Bhatye creek, Ratnagiri. The adult measuring 80-90 mm (shell) length were kept for 24 hrs in laboratory condition static bioassay test were conducted for 96 hrs and performed 7 days exposure and 7 days depuration of $ZnCl_2$. Feeding was completely stopped before and during the experiment. The experiment was conducted in natural day night rhythm.

From static bioassay test know nominal and lethal concentration *i.e.* LC_0 2 ppm and LC_{50} 4 ppm than performed 7 days exposure ($1/10^{th}$ of LC_0 and LC_{50} *i.e.* 0.2 ppm and 0.4 ppm respectively), 7 days laboratory and 7 day field depuration. For 7 days depuration (laboratory and field) animals were exposed for 7 days of $ZnCl_2$ and then returned to Zinc free normal seawater in laboratory and field for 7 days. The control was maintained simultaneously. At end of 7^{th} day of exposure and depuration, the mussels were sacrificed to analyze the glycogen content. The mussels were dissected, poolled the mantle, gills, gonads, hepatopancreas, siphon, adductor muscles and dried in oven completely than powder was prepared of experimental and control group of animals (5 individuals in each group), standard methods were employed for estimation of glycogen (De Zwaan & Zandee, 1972). The values are expressed in mg/100mg of dry tissues.

RESULTS AND DISCUSSION

Zinc chloride induced alteration in glycogen content from different body parts of *P. viridis* is presented in Table I, II and III.

Compared to control the glycogen content of 7 days exposed 1/10th LC_0 group of animals showed increase in gill [12.00 (265.86%)], hepatopancreas [9.91 (45.10%)], adductor muscles [9.15 (9.59%)] and decrease in mantle [9.41 (- 50.31%)], gonad [17.14 (- 24.26%)], siphon [6.14 (- 38.48%)] while 1/10th LC_{50} group of animals showed increase in gills [5.15 (57.02%)], hepatopancreas [22.52 (229.73%)], adductor muscles [9.30 (11.38%)] and decrease in mantle [17.59 (- 7.13%)], gonads [11.93 (- 47.29%)], siphon [8.88 (- 11.03%)] (Table I).

Table I : Effect of Zinc chloride on glycogen content from different body parts of green mussels *P. viridis* (mg/100mg dry weight) ± S.D. 7 days exposed.

Body parts	Control	1/10th LC0	1/10th LC50
Mantle	18.94±0.07	9.41±0.25 (-50.31%)	17.59±0.20 (-7.13%)
Gills	3.28±0.37	12.00±0.11 (265.86%)	5.15±0.12 (57.02%)
Gonads	22.63±0.12	17.14±0.23 (-24.26%)	11.93±0.18 (-47.29%)
Hepatopancreas	6.83±0.07	9.91±0.07 (45.10%)	22.52±0.12 (229.73%)
Siphon	9.98±0.18	6.14±0.14 (-38.48%)	8.88±0.18 (-11.03%)
Adductor muscles	8.35±0.23	9.15±0.12 (9.59%)	9.30±0.18 (11.38%)

(% Difference between control to 1/10th of LC_0 and LC_{50})

Seven days laboratory depurated 1/10th LC_0 group of animals showed increase in gill [7.97 (142.99%)], hepatopancreas [16.23 (137.62%)], adductor muscles [12.96(55.21%)] and decrease in mantle [11.98 (- 36.75%)], gonad [4.96(- 78.09%)], siphon [9.30 (- 6.82%)] LC_{50} group of animals showed increase in mantle [20.92 (10.46%)], gills [12.12 (269.51%)], hepatopancreas [10.02 (46.71%)], siphon [10.33 (3.51%)] and decrease in gonads [21.87 (- 3.36%)], adductor muscles [7.40 (- 11.38%)] (Table II).

Table II : Effect of Zinc chloride on glycogen content from different body parts of green mussels *P. viridis* (mg/100mg dry weight) ± S.D. 7 days laboratory depuration.

Body parts	Control	1/10th LC0	1/10th LC50
Mantle	18.94±0.07	11.98±0.12 (-36.75%)	20.92±0.20 (10.46%)
Gills	3.28±0.37	7.97±0.07 (142.99%)	12.12±0.12 (269.51%)
Gonads	22.63±0.12	4.96±0.18 (-78.09%)	21.87±0.70 (-3.36%)
Hepatopancreas	6.83±0.07	16.23±0.23 (137.62%)	10.02±0.07 (46.71%)
Siphon	9.98±0.18	9.30±0.14 (-6.82%)	10.33±0.18 (3.51%)
Adductor muscles	8.35±0.23	12.96±0.14 (55.21%)	7.40±0.35 (-11.38%)

(% Difference between control to 1/10th of LC_0 and LC_{50})

Seven days field depurated $1/10^{th}$ LC_0 group of animals showed increase in mantle [22.36 (18.06%)], hepatopancreas [21.15 (209.67%)], siphon [14.17 (41.98%)], adductor muscles [9.80 (17.37%)], and decrease in gill [2.90 (- 11.50%)], gonads [4.61 (- 79.63%)] whereas $1/10^{th}$ LC_{50} group showed increase in hepatopancreas [9 03 (32.22%)], siphon [11.62 (16.44%)], adductor muscles [8.54 (2.28%)] and decrease in mantle [16.19 (- 14.51%)], gill [2.56 (- 21.96%), gonad [4.96 (- 78.09%)] (Table III).

Table III : Effect of Zinc chloride on glycogen content from different body parts of green mussels *P. viridis* (mg/100mg dry weight) ± S.D. 7 days field depuration.

Body parts	Control	$1/10^{th}$ LC_0	$1/10^{th}$ LC_{50}
Mantle	18.94±0.07	22.36±0.07 (18.06%)	16.19±0.18 (-14.51%)
Gills	3.28±0.37	2.90±0.14 (-11.59%)	2.56±0.07 (21.96%)
Gonads	22.63±0.12	4.61±0.07 (-79.63%)	4.96±0.14 (-78.09%)
Hepatopancreas	6.83±0.07	21.15±0.12 (209.67%)	9.03± 0.11 (32.22%)
Siphon	9.98±0.18	14.17±0.42 (41.98%)	11.62±0.07 (16.44%)
Adductor muscles	8.35±0.23	9.80±0.07 (17.37%)	8.54±0.14 (2.28%)

(% Difference between control to $1/10^{th}$ of LC_0 and LC_{50})

In the present study decreased level of glycogen is found in tissues like mantle, gonad and siphon during exposure to $ZnCl_2$. This is consistent with the report of Bengeri & Patil (1986) in *Labeo rohita* exposed to zinc, significant decrease in liver glycogen by Manganese exposure to *Colisa fasciatus* by Nath & Nishit (1987), decrease in glycogen in testis of crab *Barytelphusia guerini* by Nagabhushanam *et al.* (1991) decrease in tissue glycogen of crab *B. cunicularis* exposed to $CdCl_2$ and $HgCl_2$ by Shaikh (1999). In this investigation decrease in glycogen content may be due to an increased phosphorylase activity which catalyses the breakdown of tissue glycogen to glucose, also one of the probable reason may be decreased glycogenesis resulting decreased glycogen level. Dhar *et al.* (1980) observed decreased glycogen level due to decreased glycogenesis.

During the exposure and depuration, period the glycogen content increased in gill, hepatopancreas and adductor muscles. This may be due to the storage of glycogen because of enhanced glycogenesis. The present results are in good agreement with the findings of Bhagyalakshmi (1982) in the crab *O. senex senex* after exposure to sumithion, Farooqui (1982) observed similar results. Muley *et al.* (1987) observed increase in glycogen content in bivalve *L. marginalis* after exposure to Mercuric chloride. Machale *et al.* (1990) obtained significant increase of glycogen in crab *B. guerini* after acute exposure to Cuprous oxide and same results found by Shaikh (1996). In this present investigation field depurated group of animals showed marked increase in glycogen content this might be due to getting their own environmental condition to which mussel combat the Zinc stress.

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