

RRST-Biochemistry

Protein Changes in Different Tissues of Freshwater Bivalve *Parreysia cylindrica* after Exposed to Indoxacarb

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Article Info	Abstract
Article History Received : 27-01-2011 Revised : 25-03-2011 Accepted : 25-03-2011	Alteration in protein content was studied in freshwater bivalve <i>Parreysia cylindrica</i> exposed to acute (24 and 96 hours) and chronic (7 and 21 days) dose of indoxacarb in mantle, foot, gill, digestive gland and whole body tissue. There was significant decrease in over all protein content in mantle, foot, gills, digestive glands and whole body tissue of <i>Parreysia cylindrica</i> due to acute and chronic exposure to pesticide indoxacarb. The depletion was maximum in digestive glands than in mantle, gills, foot and whole body tissue. Pesticidal stress might have increased the proteolysis activities in the cells.
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Introduction

Pesticides are known to disturb the protein metabolism after entry in the body of organisms. The biochemical components are indices of pollution as they determine nutritional status, health and vigor of an organism. Proteins are one of the proximate constituents of the body and essential constituents of protoplasm and acts as growth material for organism. Reports are available regarding the impact of pesticides on protein metabolism in different organism. The alteration in protein content in *Lamellidens marginalis* on exposure to endosulfan was reported [9]. The impact of pesticides observed on some physiological aspects of freshwater bivalve, *Corbicula striatella* and reported decrease in protein content [2]. Protein content in mantle, foot, gill, digestive gland and whole body tissue of fresh water bivalve *Parreysia corrugata* after acute and chronic exposure to copper sulphate was studied by [1]. The study of total protein alteration in different tissues of the fresh water bivalves, *Parreysia cylindrica* after cypermethrin exposure [15].

The analysis and comparative protein profiles in different tissues namely gills, foot and mantle of two fresh water bivalves, *Lamellidens corrianus* and *Lamellidens marginalis* and found protein markers which helps to study the molluscan taxonomy [5]. Study on biochemical changes in the protein in the tissues like gills, hepatopancreas, gonads, muscle, mantle and foot of fresh water bivalve [4].

Fresh water bivalves amongst the molluscs are economically important hence, an attempt is made to investigate the effect of indoxacarb on the protein content of different tissues of fresh water bivalve, *Parreysia cylindrica*. Vital organs viz. mantle, foot, gills, digestive glands and whole body tissues are used to determine the changes in protein

content of their tissues after acute and chronic treatment to indoxacarb in the fresh water bivalves *Parreysia cylindrica*.

Materials and Methods

The fresh water bivalve *Parreysia cylindrica* were collected from the Jamda dam which is nearly 30 Kms away from Chalisgaon, Dist. Jalgaon (M.S). After collection, the bivalves were acclimatized in the laboratory condition at room temperature for 4-6 days. The active acclimatized bivalves of approximately same size were selected for experimentation. Before starting the experiment, these bivalves were divided into three groups such as A, B, and C. 'A' group of bivalves was maintained as control. 'B' group of bivalves was exposed to sub lethal dose (0.3905ppm LC_{50/2} of 96 hrs) of indoxacarb upto 96 hours. 'C' group of bivalves was exposed to chronic dose (0.07811ppm LC_{50/110} of 96 hrs) of indoxacarb, upto 21 days.

The control and experimental bivalves of A, B and C groups were dissected after acute treatment of 24 and 96 hours and chronic treatment of 7 days and 21 days. Their mantle, gills, foot, digestive glands and whole body were removed. These tissues were dried in oven at 75 °C to 80°C till constant weight was obtained and blended into dry powder. These powders were used for the estimation protein. The protein content was estimated by Lowry's method [7].

Results and Discussion

Changes in protein content in mantle, foot, gill, digestive gland and whole body tissue of freshwater bivalve, *Parreysia cylindrica* after exposure to acute and chronic concentrations of pesticide indoxacarb for 24 and 96 hours and 7 and 21 days are summarized in table No.1.

Table: 1-Profiles of protein in different tissues of fresh water bivalve, *Parreysia cylindrica* after acute and chronic exposure to indoxacarb (Values are given in mg/100 mg of dry tissue).

Tissue	Control				Indoxacarb			
	24 hrs	96hrs	7 days	21 days	Acute (0.3905ppm)		Chronic (0.07811ppm)	
					24hrs	96hrs	7days	21 days
Mantle	48.25 ± 0.12	47.69 ± 0.16	49.25 ± 0.12	48.69 ± 0.16	40.36** ± 0.31 (-16.35)	38.56* ± 1.56 (-19.14)	39.66** ± 0.31 (-19.41)	31.58* ± 0.125 (-35.14)
Foot	68.91 ± 0.94	68.212 ± 1.26	69.11 ± 0.91	68.612 ± 1.256	57.91** ± 1.21 (-15.96)	50.91* ± 1.21 (-25.36)	56.91** ± 1.26 (-17.65)	45.12* ± 1.79 (-34.23)
Gill	54.11 ± 1.25	53.74 ± 0.92	54.91 ± 1.25	54.34 ± 0.92	43.86* ± 0.95 (-18.94)	38.26* ± 1.26 (-28.80)	42.076** ± 0.925 (-23.38)	33.619* ± 1.216 (-38.14)
Digestive gland	51.31 ± 0.96	51.216 ± 1.26	51.51 ± 0.96	51.216 ± 1.26	38.12* ± 0.76 (-25.70)	29.89* ± 1.87 (-41.64)	37.06* ± 0.76 (-28.05)	28.65* ± 1.32 (-44.15)
Whole soft body	58.21 ± 0.96	58.196 ± 1.56	59.23 ± 0.96	57.196 ± 1.56	42.46* ± 0.76 (-27.40)	38.612* ± 1.16 (-33.65)	45.216* ± 0.79 (-23.67)	36.161* ± 0.56 (-36.77)

Each value is the mean of five observations ± S.D.
Where, *P<0.1, ** P<0.05 (Significant t-test)

Pesticides due to their potential toxicity produce biochemical changes in the tissues and organs of exposed animals [11]. During exposure, organism goes through a shift in all the metabolic processes to counteract the toxic effects by undergoing all protective measures. Toxic stress of any kind leads to changes in biochemical and physiological mechanism in the body of organism.

In the present study the higher depletion of protein in the digestive gland might be due to high metabolic potency and efficiency of the gland when compared to other tissues like mantle, foot, gills and whole body tissue of the bivalve. The digestive gland is site of action of pollutant in the body of bivalve or digestive gland seems to be the main site of degradation and detoxification of pesticides and hence has the largest demand of energy for the metabolic processes resulting into increasing utilization of protein to meet energy demand. The higher degradation of protein in digestive gland provided better indication of the extent of toxicity. A marked fall in the protein level in all the tissues indicates a rapid initiation of breakdown of protein. To meet energy demands during toxic stress, mobilization of protein might have taken place [6]. The depletion of tissue protein was due to diversification of energy to meet the impending energy demand under toxic stress [13].

The acute and chronic exposure to tetracycline and chloramphenicol, *L. corrianus* showed decrease in protein levels, in proportion with the period of exposure [10]. The decrease in average total protein content of tissue after treatment suggests enhancement of proteolysis to meet the high energy demands under heavy metal or other stress. The percent decrease of proteins after acute and chronic exposure

of pesticides might be due to over exertion or activity of muscle under pesticide stress. The increased protease activity in fresh water bivalve, *Parreysia cylindrica* after pesticide treatment [14]. The proteolytic activity seems to be high due to increased transaminase activity [12] by which amino acids can be catalyzed in the T.C.A. cycle as Keto acids [3]. A marked fall in the protein level in all the tissues indicates a rapid initiation of breakdown of protein. To meet the energy demand during toxic stress, mobilization of protein might have taken place [6]. The significant decrease in total protein content in foot, hepatopancreas and gills of the fresh water mussel, *Lamellidens corrianus* on exposure to organochlorine insecticide, hildan [5]. Decrease in protein content was possibly due to stress conditions caused by toxicity of indoxacarb on protein metabolism or due to enhanced proteolytic activity as a consequence of increased metabolic demands following exposure to the toxic stress of indoxacarb.

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