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Protein Content Variations of Lamellidens Marginalis in different Seasons in Different Body Parts from Godavari River, Paithan (M.S.) India

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ABSTRACT

We examined the seasonal patterns of biochemical composition in bivalve, Lamellidens marginalis from Godavari River, Paithan. In the present study, variations in organic constituents were observed in different body parts of the species. In all body parts of the bivalve the protein was found maximum during monsoon season (June) and was found minimum during summer season (May) of dry tissue weight. The bivalve mollusc shows maximum variation of biochemical constituents as it undergoes different stages like development, maturation and spawning during different seasons and can be affected by environmental factors, such as fluctuations in the environmental conditions, or by internal factors, such as metabolic and physiological activities. It might be the spawning cycle and food supply are the main factors responsible for this variation. It is well known that seasonal variations in nutritional contents of bivalves are closely linked to the reproductive cycle and climate changes and are affected by the availability and composition of the natural diet. As changes in the environmental conditions, it showed an effect on protein contents in the tissues like, mantle, hepatopancreas, gonad, gill and foot. Protein content maximum found in gonads throughout all the three seasons, whereas mantle shows minimum values of protein. There are great fluctuations in the values of protein during different seasons.

Keywords : Freshwater Bivalves, L. Marginalis, Protein.

I. INTRODUCTION

Food is important source of energy for all living organisms. Food energy is used for building up body tissue, which further signifies that a balance diet is necessary for proper functioning of the body. In invertebrates changes in the biochemical constituents are pronounced which are cyclic in reproduction, since a great amount of energy must be channelized to the gonad during reproduction. Government of India is providing lot of facilities to man for blue revolution by which little bit problem of food supply will be solved. During the study the experiments which will carry on the aspects on the identification of the factors responsible for the decline of the freshwater mussels, in order to develop a restoration plan for the species. The studies on biochemical response of a bivalve to stressors have led to the better understanding as to how bivalve cope with the stressor at the biochemical level. Biochemical indices are often very sensitive to sub lethal toxicants and the magnitude of the biochemical changes is often related to the severity of the toxicants (Livingston, 1985). Thomas *et al.,* (1987) reported some of the biochemical responses, which indicated specific relation and other pathological effects, and therefore can provide information on the mode of toxicity.

In addition, biochemical assay provide both qualitative and quantitative changes of tissue level in the bivalve. Sometime specific responses shown by, for example, fishes to certain kind of toxicants such as heavy metals pesticides are particularly useful in fishery management and resources protection (Petering and Fowler, 1986, and Thomos 1989, Suryawanshi *et al,* 2015). Heavy metal stress alters protein content in the aquatic animals and it has been found that generally the protein content from the whole body and different body parts, increased in fish *Tilapia mossambica* due to metals toxicity. Shivaprasadrao and Ramanarao (1979). Jacobson and Turner (1980) studied interaction of cadmium and certain other metals with proteins. Kulkarni (1993) and Patil (1993) studied cadmium chloride and summer induced changes in the biochemical composition of the freshwater bivalve *L. marginalis* respectively. Devi (1995, 1996) studied bioaccumulation and metabolic effects of zinc and mercury on marinedreissinid bivalve, M. sallei. Munsi et al.,(1997) studied the mixture of heavy metals on the biochemical composition of two penaeid shrimp post larvae. Mane and Gokhale (1990) observed biochemical changes due to acute toxicity of fluoride to L. marginalis and found significant changes in protein content from mantle, gill, hepatopancreas, gonad and foot. Napolitund et al., (1992) studied the lipid composition of egg and adductor muscle in giant scallops P. magellanicus. Arasu et al., (1995) reported changes in lipid peroxidation in the gill and muscle of P. viridis during exposure of cadmium and copper. Patil and Mane (1997) and Suryawanshi et al, (2017) studied seasonal changes of different body parts of L. marginalis during exposure of heavy metals. The present study was taken up to understand the distribution and seasonal variations of biochemical in Lamellidens marginalis inhabiting fresh water at Nagapur dam near Parali (V), Maharashtra. Seasonal variations in reproductive activity and gross biochemical composition in adult clam Tapes decussates and Tapes philippinarum was reported by Peter and Albert, 2003. Salaskar and Nayak, (2011) have reported composition of biochemical constituents in Crassostrea madrasensis and Perna viridis from Kali estuary, Karnataka. The review of above literature shows that there is no adequate information about freshwater mollusc, Lamellidens marginalis from different rivers of Maharashtra. Hence, the present study was carried out to understand the changes in protein content through regular collection of animals from Godavari River at Paithan near Aurangabad.

II. MATERIALS AND METHODS:

The freshwater bivalve mollusc, Lamellidens marginalis were collected from the Godavari River at Paithan, 50 km. away from Aurangabad, in summer season (April –May), monsoon season (August – September) and winter season(December – January) over a period of one year. Adult bivalves (80 mm in shell length) were selected for laboratory experiments. Immediately after bringing to the laboratory, the shells of these bivalves were brushed and washed with fresh and clean water to remove algal biomass, mud and other waste material. The cleaned animals were then kept for depuration for 12 hr in laboratory conditions under constant aeration. No special food was supplied during the experiment. For biochemical analysis, animals were dissected and soft body tissues like mantle, hepatopancreas, foot, gonads and gill were removed. 100 mg of each wet tissues were taken for biochemical analysis. Protein was determined by the method proposed by Lowry et al., (1951), using Bovine Serum Albumin (BSA) as standard. The results are expressed as milligram content per 100 mg. of wet tissue. Triplicate values of each biochemical constituents were subjected for statistical confirmation using student 't' test (Dowdeswell, 1957). Standard deviations were calculated during each season. Since the animals are micro feeders The amount of biochemical was obtained were statistically analyzed for confirmation of the results and expressed in μg/g dry tissue.

III. Results

The protein contents observed during the experimental work has been given in table-1.

Summer:

In Control group increased value from mantle (17.025±0.296) followed by gill (10.51±0.053), hepatopancreas (8.465±0.198), foot (7.876±0.979) and gonad (6.713±0.054).

In LC0 group the content of protein is revealed high value showed from hepatopancreas (10.232±0.398) followed by foot (9.563±0.189), gonad (8.546±0.369), gill (6.283±0.177) and mantle (5.845±0.165).

In LC50 group increased value from hepatopancreas (10.691±0.416) followed by gonad (8.725±0.371), gill (6.116±0.172), mantle (5.428±0.168) and foot (3.214±0.168).

Monsoon:

In Control group increased value from gonad (14.929±0.391) followed by hepatopancreas (12.029±0.624), mantle (9.563±0.459), gill (8.119±0.344) and foot (7.049±0.054).

In LC0 group the content showed high value in mantle (8.766±0.249), followed by gill (7.469±0.288), foot (6.987± 0.172), gonad (5.998±0.166) and hepatopancreas (5.744±0.197).

In LC50 group the content of protein was high from hepatopancreas (8.962±0.262) followed by foot (8.521±0.276), gonad (7.623±0.212), mantle (5.419±0.172) and gill (5.243±0.161).

Table 1

Biochemical constituents	Summer			Monsoon			Winter		
	Control	LC0 Group	LC50 Group	Control	LC0 Group	LC50 Group	Control	LC0 Group	LC50 Group
Mantle	17.025±0.296	5.845±0.165 (65.66%) ***	5.428±0.168 (107.74%) *** (5.60%) 00	9.563 ±0.459	8.766±0.249 (8.33%) **	5.419±0.172 (43.33%) *** (38.1%) 000	12.638±0.454	6.246±0.276 (50.57 %) ***	3.286±0.142 (73.99%) *** (47.39%)000
Gill	10.51 ± 0.053	6.283±0.177 (40.21 %) ***	6.116±0.172 (41.80%) *** (2.65%) 0	8.119 ±0.344	7.469±0.288 (10.46%) **	5.243±0.161 (35.42%) *** (27.87%) 000	10.098±0.769	5.438±0.221 (46.14%) ***	3.478±0.124 (65.55%) *** (36.04%)000
Gonad	6.713±0.054	8.546±0.369 (27.30%) ***	8.725±0.371 (29.97%) *** (2.09%) NS	14.929 ±0.391	5.998±0.166 (56.93%) ***	7.623±0.212 (45.27%) *** (27.09%)000	8.228 ±0.053	3.584±0.127 (56.44%) ***	5.287±0.217 (35.74%) *** (47.51%)000
Hepatopancreas	8.465±0.198	10.232±0.398 (20.87%) **	10.691±0.416 (25.23%) *** (2.02%)Ns	12.029 ±0.624	5.744±0.197 (52.24%) ***	8.962±0.262 (25.49%) *** (56.02%)000	8.963 ±0.054	3.314±0.148 (63.02%) ***	6.689±0.243 (25.37%) *** (101.84%)000
Foot	7.876±0.979	9.563±0.189 (21.41%) **	3.214±0.168 (59.192%) *** (66.39%) 000	7.049±0.054	6.987±0.172 (0.87%) NS	8.521±0.276 (20.88%) *** (21.95%) 00	11.456±0.110	5.846±0.234 (49.02%) ***	7.842±0.212 (31.54%) *** (34.28%)000

Changes in the protein from different body parts of Lammellidens marginalis after exposure of acute toxicity tests of mercury in different seasons

Winter:

In Control group increased value from mantle (12.638±0.454) followed by foot(11.456±0.110),gill(10.098±0.769), hepatopancreas (8.963±0.054) and gonad (8.228±0.053).

In LC0 group protein content was highest value showed in mantle (6.246±0.276) followed by foot (5.846±0.234), gill (5.438±0.221), gonad (3.584±0.127) and hepatopancreas (3.314±0.148).

In LC50 group content showed high value in foot (7.842±0.212) followed by hepatopancreas (6.689±0.243),
gonad(5.287±0.217),gill(3.478±0.142) and mantle (3.286±0.142).

IV. Discussion

The present study revealed that, there is significant variation in the protein content different body tissues according to seasonal changes metabolic activities. Protein is the main organic nutrient used. to build up different body tissues. It is observed that protein contents are significantly accumulated in gonad and foot during summer season. Mantle shows decreased amount of protein, which may be due to exposure to high environmental temperature. All the tissues show constant protein contents in monsoon season, which is correlated with highest body activities of animal during this season. Hongwei Yan et al.,(2009), observed protein and lipid content increased in association with the gametogenesis in the female gonads of razor clam, Sinonovacula constricta. The study revealed that in terms of energy conservation, the organism would be expected to make compensatory adjustments to both the components of energy gain and energy loss in the fate of changes in the environmental conditions (Vedpathak, 1989 All the body organs show minimum protein values in winter season, which may be due to sedentary life without much activities.

V. CONCLUSION

The increased in protein level in all the seasons might be the result of high dividing capacity of mercury and the activation of the energy which increased the protein synthesis. A decrease in protein content at acute exposure of heavy metal mercuric chloride to *Lamellidens marginalis* suggest the possible utilization of protein for metabolic purpose and enhanced proteolysis, to meet the high energy demand under toxicants stress. Decrease in protein content indocile severe stress experienced in the elimination of heavy metals. After exposure to mercury chloride an increase is protein was observed is almost all tissues, similarly gradual decrease is protein content was observed almost all tissues. Thus, in the present study on Lamellidens marginalis, it is observed that organic constituents present in different body tissues shows seasonal changes and are correlated with the change in environmental conditions along with development of reproductive cycle.

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