

Seasonal Variations in Protein Content in Different Body Tissues of Freshwater Bivalve Mollusc, *Lamellidens Marginalis* (Lamark) From Godavari River in Maharashtra

Sable D.B. and A.N. Vedpathak

Molluscan Endocrinology and Physiology Laboratory, Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad – 431004 (M.S.), India.

Abstract

In the present study, variations in organic constituents in different soft body parts of *Lamellidens marginalis* found in Godavari River near Aurangabad was observed during different seasons. As environmental condition changes, it shows an effect on protein content in the tissues like mantle, hepatopancreas, foot and gonad. Protein was found maximum in gonads viz. 11.270 to 11.320 mg/100mg during summer, 8.810 to 8.954 mg/100mg during monsoon and 6.754 to 7.002 mg/100mg during winter season. Protein was found minimum in mantle during winter season (4.113 to 4.245 mg/100mg).

Keywords: *Lamellidens marginalis*, Protein, Godavari river.

INTRODUCTION

The freshwater bivalve molluscs are suspensory feeders on the primary stage of food chains, hence they notably influences the organization and functioning of ecosystems. Also, they perform efficient role in transformation of energy in food chains coupled with their sessile mode of life. Seasonal changes in biochemical composition have been reported by many workers. Ansell et al. (1964), De Zwann and Zandee (1972), Gabbott and Bayne (1973) determined seasonal changes in biochemical composition of adductor muscle, mantle, siphon and foot in *Mercenaria mercenaria* and

Mytilusedulis. From India, relatively very few investigators such as Bidarkar (1975) on *Crassostrea cucullata*, Dhamane (1975) on *Paphia laterisulca*, Nagabhushanam and Mane (1975,1978) on *Mytilus viridis*, have reported changes in the biochemical composition correlating with annual reproductive cycle of bivalves. Protein is a versatile, complex and fragile macromolecule with high molecular weight. It serves as fuel to yield energy and also play a vital role in every aspect of the structural and functional characteristics of the organism. Vedpathak (1989) observed fortnightly and monthly changes in biochemical composition in freshwater molluscs. In recent times, investigations on the physiological and biochemical responses of the molluscs to environmental agents have been expanded significantly. 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.

MATERIALS AND METHODS

The freshwater bivalve mollusc, *Lamellidens marginalis* were collected from the banks of 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. For biochemical analysis, animals were dissected and soft body tissues like mantle, hepatopancreas, foot and gonads 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.

RESULTS AND DISCUSSION

Biochemical analysis observed during experimental work has Biochemical analysis observed has been given in Table 1. Protein is found maximum in gonads throughout

all the three seasons. During summer season, gonad shows 11.320 ± 0.531 mg/100 mg of wet tissue in the month of May, whereas it shows values 11.2700 ± 0.235 in April. Protein is also observed maximum in foot during summer season, as compared with monsoon and winter seasons. During monsoon, values of protein in gonad (8.954 ± 0.213) and foot (7.892 ± 0.312). The values of protein in mantle show a constant decrease. It is found to be 6.102 ± 0.202 in April and 5.530 ± 0.112 in May, which decreases to 5.680 ± 0.137 in September. Mantle tissues show minimum protein (4.113 ± 0.162) during winter season. Similar pattern is observed for protein contents in hepatopancreas. It shows maximum values in April (6.780 ± 0.127) and minimum in December (4.10 ± 0.219)

Table 1: Changes in the protein contents from different tissues of *Lamellidens marginalis* collected during different seasons.

Tissues	Summer season		Monsoon season		Winter season	
	April	May	August	September	December	January
Mantle	6.102 ± 0.202	5.530 ± 0.112	6.00 ± 0.233	5.680 ± 0.137	4.113 ± 0.162	4.245 ± 0.341
H.P	6.780 ± 0.127	6.489 ± 0.195	5.870 ± 0.347	5.249 ± 0.180	4.101 ± 0.219	4.253 ± 0.421
Foot	8.872 ± 0.460	8.934 ± 0.279	7.849 ± 0.210	7.892 ± 0.312	5.720 ± 0.187	5.879 ± 0.121
Gonad	11.270 ± 0.235	11.320 ± 0.531	8.810 ± 0.249	8.954 ± 0.213	7.002 ± 0.118	6.754 ± 0.200

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. 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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