STUDIES ON THE BIOCHEMICAL COMPOSITION OF THE SHORT NECK CLAM, *PAPHIA MALABARICA* FROM ASHTAMUDI ESTUARY, SOUTHWEST COAST OF INDIA

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INTRODUCTION

Considering the importance of bivalves as a source of protein rich food for man, there has been considerable work on the biochemical composition of commercially important species from all over the world. From Indian waters, edible bivalves, mussels, clam and pearl oysters were studied for its biochemical composition. *Paphia malabarica*, an edible bivalve is being exploited commercially in good quantities and exported since 1981. This species alone contribute 90% of India's clam meat export and the bulk of the catch come from Ashtamudi estuary in the southwest coast of India. So far there is no attempt to study the biochemical composition of this bivalve from Indian coast. In the present investigation, biochemical composition of whole body of this clam was taken up to understand the seasonal changes in nutritive value of two size groups from Ashtamudi estuary.

MATERIALS AND METHODS

Materials for the present study were collected for one year period from February 1989 to January 1990 at monthly intervals from Ashtamudi estuary, where commercial exploitation of this clam is being done. Samples collected each month were grouped into smaller size group below 30 mm and larger size group above 30 mm. From a weighed sample of clams the meat is extracted, homogenised, reweighed and transferred to petridishes and dried on hot air oven at 60°C for 24 hours. The reweighed, dried meat is used for estimation of biochemical constituents viz., protein, fat, carbohydrate and ash. The biochemical composition is expressed as percentage of dry meat weight.

Water content was determined by calculating the difference between the wet meat weight and dry meat weight of samples. Protein content of the whole body was estimated by microkjeldahl procedure and estimation of fat by soxhlet ether extraction method. Ash content was determined by incinerating known weight of the dry and powdered meat at temperature exceeding 500°C. The carbohydrate content was obtained by calculating the difference of the sum of protein, fat and ash fractions from 100%. Calorific value was estimated using calorific equivalent of protein (5.65 Kcal/g), glycogen (4.2 Kcal/g) and fat 9.45 Kcal/g).

RESULTS

Results of biochemical analysis of *Paphia malabarica* are graphically represented in Fig. 1. Percentage of meat content for various months is given in Table 1. Analysis of percentage of meat weight value showed that in smaller size group it ranged from 24.2 to 29.2% and in larger size group

Table 1. Wet meat weight percentage in *Paphia malabarica* for two size groups from Ashtamudi estuary

Months	Wet meat weight %	
	Smaller size	Larger size
February 1989	25.8	18.8
March	23.8	22.1
April	25.3	20.5
May	23.9	22.0
June	29.2	24.0
July	25.2	21.5
August	24.2	22.8
September	25.5	22.4
October	18.5	18.6
November	21.5	23.9
December	28.4	22.6
January 1990	22.8	24.8

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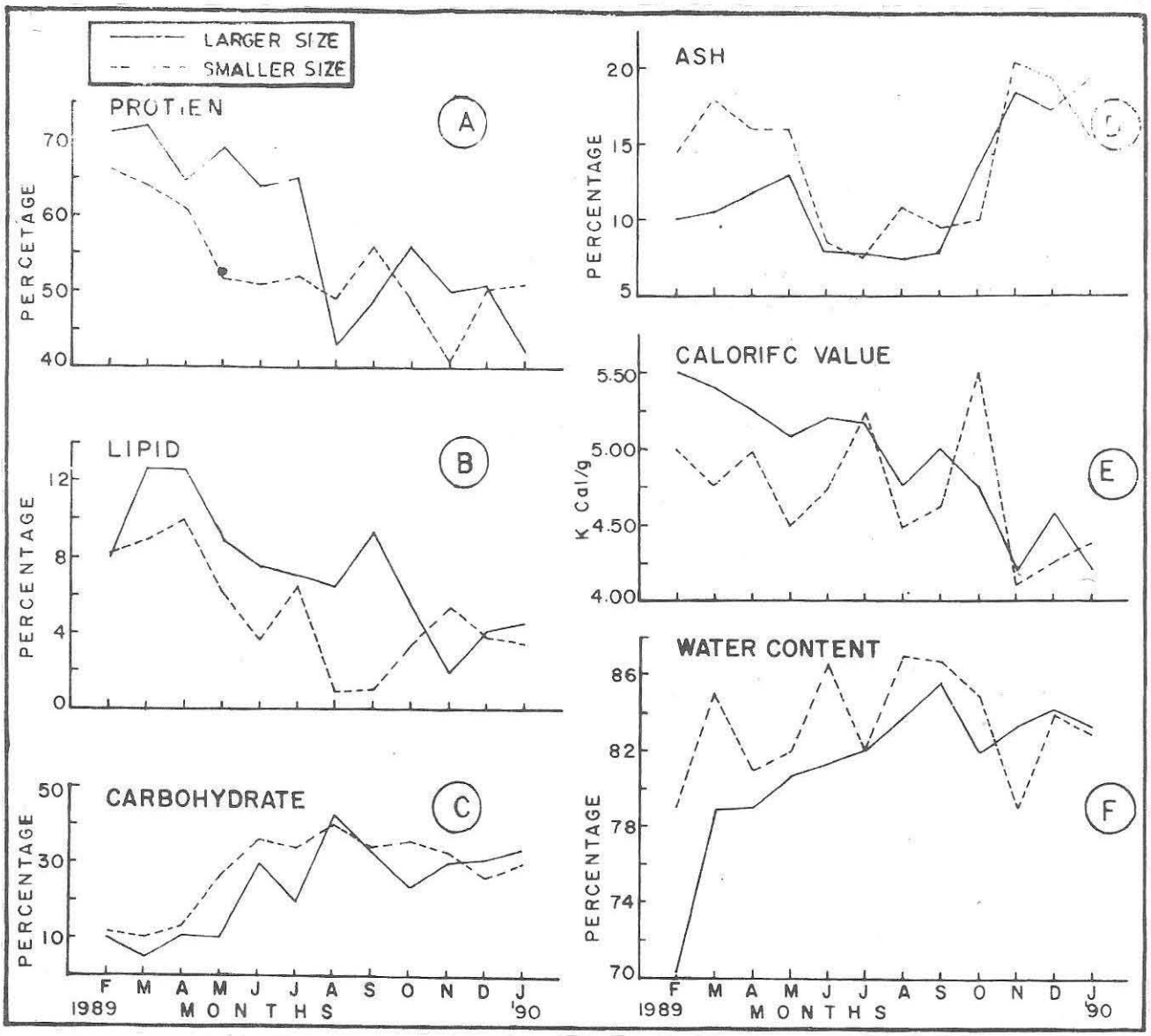
21.5 to 24.8%. A decline in meat weight was noticed in post-monsoon period for both the size groups. Meat content was high during monsoon period

Water content showed marked variation during one year period (Fig. 1.F). It was lowest in smaller size group during November and February and it ranged from 79.4 to 86.83%. In larger size group, water content ranged from 70.14 to 85.64% with lowest value in February and highest in September. In general, water content showed gradual increase through the pre-monsoon months and reached maximum in monsoon in both the size groups.

Protein content also showed seasonal changes in both the size groups (Fig. 1.A). Protein value of smaller size group ranged from 40.75 to 66.37% with lowest value in November and highest in February. In large size group it ranged from 42.62 to 71.92%, the lowest in January and highest in March. Thus protein value showed high percentage in both the groups during monsoon and post-monsoon months.

Lipid value in small size groups ranged from 0.99 to 9.97% with high value in April. There was a decrease in lipid content in



monsoon. In larger size group, the highest lipid content was observed during pre-monsoon period. The lipid value ranged from 1.99 to 12.36% recording the maximum in April (Fig. 1B).

Carbohydrate or glycogen content also showed seasonal variations in both the size groups (Fig. 1.C). The carbohydrate value ranged from 9.22 to 39.55% in smaller group with high values during monsoon and gradually declined in post-monsoon months. In larger size group the value ranged from 2.08 to 43.06% with highest values in monsoon. Both the groups showed the similar trends.

Ash content in smaller size groups was generally high in post-monsoon period and showed a gradual decline during monsoon. The values ranged from 7.49 to 20.55% during the observation period. In higher size group it ranged from 7.79 to 19.45% with highest values during post-monsoon months (Fig. 1.D).

Calculated calorific values were high during pre-monsoon and post-monsoon months. In smaller size groups it varied from 4.46 to 5.25 Kcal/g with maximum in July whereas in post-monsoon period it ranged from 4.17 to 4.52 Kcal/g with minimum in November. In larger size group high value prevailed in pre-monsoon and post-monsoon months ranging from 4.78 to 5.43 Kcal/g. During monsoon low calorific values were recorded for both the groups (Fig. 1.E).

DISCUSSION

The results of the present study reveal that the differences in the percentage in meat content, water content and bio-chemical composition between two size groups are not pronounced, but seasonal variations exist. In tropical bivalves, reproductive cycle is responsible for variation in the biochemical changes (Giese and Pearse, 1974). In the present study also variations in the biochemical composition were pronounced in larger size group, where reproductive bodies are developed. Specific food or environmental factors do not vary significantly in tropical estuaries, whereas the south-west and northeast monsoon play an important role in shaping environmental condition which in turn influence the gonadial development and spawning in most of the invertebrates (Paul, 1942). The spawning period of *P. malabarica* in Ashtamudi estuary is September to December and a corresponding decline in calorific value was also noticed in the present observation. An inverse relationship between carbohydrate and protein was observed in both the size groups. Lipid and protein values were high during pre-monsoon period whereas carbohydrate value was lowest during pre-monsoon and highest during monsoon. Mc Lachlan and Lombard (1980) indicated that lipid and protein reserve are used by molluscs during stress condition in winter. The present study indicates that the low salinity in monsoon months and the spawning activities in the post-monsoon months cause stress to *P. malabarica* in Ashtamudi estuary and this is being reflected in the low values of protein and fat. Calorific value was high during pre-monsoon period, gradually declining through monsoon and post-monsoon. In general, energy is stored prior to gametogenesis and utilised in the production of gametes when metabolic demand is high (Giese, 1969). In the present study also the energy storage is high during pre-monsoon period as noticed by high protein and fat values. In *P. malabarica* gametogenesis starts by monsoon and the calorific value shows a declining trend. Present study indicates that pre-monsoon period is the ideal time for maximum exploitation of this clam from Ashtamudi estuary when calorific value is high.

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