

Comparative Study on the Biochemical Compositions of Four Gastropods along the Kanyakumari Coast

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Abstract: The biochemical composition is the yardstick to measure and assess the nutritional quality of food sources. Consumer awareness regarding the nutritional quality of food is very essential. The molluscs are excellent sources of protein, carbohydrate, lipid, etc. which render them highly nutritious for human consumption. Biochemical studies are very important from the nutritional point of view. In the present study biochemical constituents such as protein, carbohydrate, lipid, water and ash were estimated in the four selected gastropods *Babylonia zeylanica*, *Murex virgineus*, *Babylonia spirata* and *Trochus radiatus*. The present study reveals that the protein content of *B. zeylanica* was found to be higher than that of other three gastropods whereas the other biochemical constituents also found to be high in *B. zeylanica* except ash.

Key words: Kadiapattinam • *Babylonia zeylanica* • *Murex virgineus* • *Babylonia spirata* • *Trochus radiatus* • Nutritive Value

INTRODUCTION

India has a long coast line of 8129 km with rich marine fishery resources consisting of chiefly of fishes, crustaceans and molluscs. There is a high demand for animal protein due to population explosion. Molluscs form a cheap alternate animal protein which can be utilized either for human consumption or as fish meal or manure. Due to lack of awareness, molluscs are not popular food in India. The knowledge of the chemical composition of any edible organisms is extremely important since the nutritive value is reflected in its biochemical contents [1]. A newer species should be recommended for human consumption only after assessing the nutritive value of that species with regards to its nutritional merits [2]. Even though large numbers of marine gastropods are suitable for human consumption, our knowledge on its nutritive value is fragmentary. Generally proximate composition means percentage composition of five basic constituents such as water, protein, lipid, carbohydrate and ash.

Biochemical assays play a major role in recent years. The biochemical composition is the yardstick to measure and assess the nutritional quality of food sources. Consumer awareness regarding the nutritional quality of

food is very essential. Generally proximate composition means percentage composition of five basic constituents such as protein, carbohydrate, lipid, ash and water. The molluscs are excellent sources of protein, carbohydrate, lipid, etc. The marine molluscs store large quantities of protein, fat and carbohydrate which render them highly nutritious for human consumption. Molluscs also contain minerals, which are essential for a balanced diet. The present study deals with the analysis of the major biochemical constituents of four selected gastropods.

MATERIALS AND METHODS

The gastropods *B. zeylanica*, *M. virgineus*, *B. spirata* and *T. radiatus* were collected among trash fish during June, 2011 from trash fish landings at Colachel. They brought to the laboratory and cleaned with distilled water. The shells were broken and the soft tissues were removed and dried in hot air oven at 50°C. The dried samples were subjected to biochemical estimations.

Estimation of Biochemical Constituents: The Folin-Ciocalteu Phenol method of Lowry *et al.* [3] was adopted for the estimation of total protein in the tissue. Phenol-sulphuric acid method of Dubois *et al.* [4] was

Table 1: Biochemical constituents of four gastropods.

| Name of the Gastropods | Protein (%) | Carbohydrate (%) | Lipid (%) | Ash (%) | Water (%) |
|------------------------|-------------|------------------|-------------|-------------|-------------|
| <i>B. zeylanica</i> | 43.2 ± 0.94 | 19.6 ± 0.23 | 6.2 ± 0.16 | 0.89 ± 1.4 | 82.33± 0.47 |
| <i>M. virgineus</i> | 39.8 ± 0.23 | 19.5±0.32 | 4.7 ± 0.16 | 1.13 ± 0.16 | 76.2 ± 0.82 |
| <i>B. spirata</i> | 36.0 ± 0.16 | 13.75±0.17 | 1.45 ± 0.04 | 1.18 ± 0.28 | 72.8±1.23 |
| <i>T. radiatus</i> | 28.55 ±0.34 | 6.7 ±0.12 | 1.1 ± 0.10 | 0.96 ± 0.01 | 66.76±0.02 |

followed for the estimation of total carbohydrate. Chloroform-methanol method of Folch *et al.* [5] was used for estimation of lipid in tissue.

Estimation of Water Content:

$$\% \text{ of moisture content} = \frac{\text{Amount water in the body tissue}}{\text{Wet weight of body tissue}} \times 100$$

Estimation of Ash Content: 1g of powdered tissue was taken in a porcelain crucible and kept in a muffle furnace at 60°C for 4 hours. The ash content was weighed.

RESULTS

Total protein, total free sugar, total lipid, water and ash were estimated for the four studied gastropods; *B. zeylanica*, *M. virgineus*, *B. spirata* and *T. radiatus*. The results were presented in Table 1 and Fig 1.

Total Protein: The percentage of total protein content was estimated in *B. zeylanica*, *M. virgineus*, *B. spirata* and *T. radiatus* was observed to be 48.2%, 39.8%, 36.0% and 28.55% respectively. It was found to be maximum in *B. zeylanica* and minimum in *T. radiatus*.

Total Free Sugar: The total free sugar level in *B. zeylanica*, *M. virgineus*, *B. spirata* and *T. radiatus* were observed to be 19.6%, 19.5%, 13.75% and 6.7% respectively. As like protein, total free sugar level was high in *B. zeylanica* and *M. virgineus*.

Total Lipid: Next to carbohydrates, lipids are the major biochemical constituent in gastropods. The total lipid level of *B. zeylanica*, *M. virgineus*, *B. spirata* and *T. radiatus* were 6.2%, 4.7%, 1.45% and 1.1% respectively. Total lipid content is also found to be high in *B. zeylanica*.

Water Content: Moisture content is one of the most important biochemical constituents of gastropods. The moisture content in the body tissues of four studied

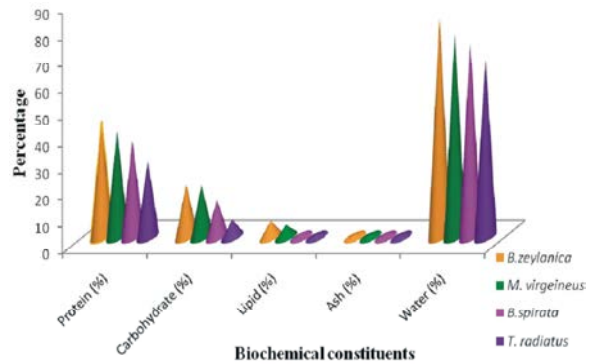


Fig. 1: Proximate composition of Biochemical constituents in four gastropods

gastropods; *B. zeylanica*, *M. virgineus*, *B. spirata* and *T. radiatus* were 82.33%, 76.2%, 72.8% and 66.76% respectively.

Ash: The ash content of the gastropods was very less which is about 1.18% in *B. zeylanica* followed by 1.13% in *M. virgineus*, 0.96% in *B. spirata* and 0.89% in *T. radiatus*.

Comparison of biochemical constituents of four studied gastropods revealed that the protein content of *B. zeylanica* was found to be higher than that of other three gastropods whereas the other biochemical constituents also found to be high in *B. zeylanica* except ash.

DISCUSSION

Studies have been indicating that molluscs constitute an important protein source [6] and in that respect they can be used to alleviate protein deficiency problems in developing countries. Furthermore, it has been reported that high quality proteins from mussels have a high essential amino acid indices and a biological value (higher than beef) and that these nutritional value increases after cooking. It has been demonstrated that when cooked in water or fried, the nutritional value of mussel increased [7].

Biochemical assays and nutrients play a vital role on physical growth and development, maintenance of normal body function, physical activity and health.

The knowledge of the biochemical composition of any edible organisms is extremely important since the nutritive value is reflected in its biochemical contents [8].

Nirmal [9] reported about the protein content of foot, mantle, testis and ovary in *Babylonia zeylanica*, which was ranging between 40.31%-85.33%. But in our present study the total protein content of whole body tissue of *B. zeylanica* and *B. spirata* were 43.2% and 39.8% respectively. In the present observation the protein content of *T. radiatus* was found to be 28.55 % which was slightly resembling the results of Babu *et al.* [10] who reported that the composition of protein in *B. spinosa* foot to be 22.1%, mantle, 19.25%, gonad, 27.95% and other body tissue as 24.18%. In the present observation all the biochemical constituents of *B. zeylanica* was higher than the others except ash. Amal and Nedra [11] observed that the amount of carbohydrates and protein were higher in female gonad than in the male gonad in *Donax trunculus*. The lipid value of *D. trunculus* decreased during spring and summer and in the case of protein the highest values were observed during summer. Zandee *et al.* [12] observed the seasonal variations in biochemical composition of *Mytilus edulis* with reference to energy metabolism and gametogenesis.

According to Ansari *et al.* [13], the carbohydrate of molluscs are mainly composed of glycogen and changes in the carbohydrate level due to the accumulation of glycogen at different stages like gametogenesis and spawning. In *T. brunneus*, the carbohydrate content was high in foot (8.825%) followed by gonad (6.14%) and mantle (5.82%). In the present study also the carbohydrate content of *T. radiatus* was 6.7%. In *T. brunneus*, the major variation in carbohydrate value showed that it could be utilized in considerable quantity for various metabolic activities. In general, carbohydrate values were ranging between 1.1-9.2% in male and 1.5-9.2% in females [14].

The digestive gland of *Tivela stultorum* contains about 10-20% lipids while other tissues, apart from the gills and mature ovarium (10%) are poor in lipids. In our present observation the lipid content was varied from 1.1-6.2% which was similar to the reports of Lombard [15]

Giese [16] observed that the moisture content of *Unio terminalis* was 80.36% and *Patomida littoralis* was 81.69%. The moisture content of four gastropods ranged from 66.76%-82.33% in the present observation.

It has been observed that the protein content of *B. zeylanica* was higher than that of other three gastropods. From the point of protein content of meat,

B. zeylanica was considered to be of high in nutritive value than others. Further investigation is necessary to assess the nutritional quality of the four gastropods such as amino acids, essential fatty acids etc. *B. zeylanica* already has been eaten by the local people of Kadiapatnam, Innayam and Colachel in Tamilnadu and Neendakara and Sakhikulangara of Kerala. These four species of gastropods are abundant among the trash fish landings and their nutritive value is high. As they are cheap protein it may be recommended for human consumption.

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