

## **Biochemical composition of three Potamidid snails-*Telescopium telescopium*, *Cerithidea cingulate* and *C. obtusa* of Tekkali Creek (Bhavanapadu Mangroves), Andhra Pradesh, India**

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### **ABSTRACT**

Carbohydrates, proteins and lipids were estimated in three species gastropod, *Telescopium telescopium*, *Cerithidea cingulata* and *C. obtusa* at Tekkali creek. Carbohydrates were 0.80 % in *T. telescopium*, 0.58 % in *C. cingulata* and 0.84 % in *C. obtusa*. The proteins were 21.01%, 13.08 % and 20.38% in *T. telescopium*, *C. cingulate* and *C. obtusa* respectively. Lipids were 18.9 %, 16.57 % and 19.5% in the respective three species. Albumin proteins were assayed with water and with KCl at different molarity i.e., 0.1M, 0.2M, 0.3M, 0.4M and 0.5 M and the values showed an increasing trend with increasing salt concentration, ranging from 0.01 % to 2.07 %.

**Key words:** Biochemical composition, potamidid snails, Tekkali creek.

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### **INTRODUCTION**

Molluscs serve as a good source of valuable minerals, vitamins besides proteins and essential fatty acids [1, 2, 3, 4 & 5]. The biochemical composition of any organism depends on sex, size, physiological state [6]. The percentage of carbohydrates have been found to be low when compared to proteins and lipids in aquatic organisms [7]. The molluscs are an excellent source of proteins of high biological value [8]. Small peptides and amino acids of the proteins can contribute to food texture and flavour [9].

Albumins proteins of the muscles are soluble in water, coagulated by heat and precipitated in salt solutions of low ionic strength < 0.5M. Albumins include water-soluble myoalbumins and water-insoluble myogens contributing about 16-22% of the total proteins [6]. Relatively little work has been done on muscle proteins except albumin [10, 11, 12 & 13]. Hence an attempt is made to estimate the carbohydrates, proteins, lipids and albumin proteins quantitatively in three gastropods of Tekkali mangroves.

### **MATERIALS AND METHODS**

Samples were collected from Tekkali creek (Bhavanapadu mangroves) by hand-picking and digging. Among the three *C. obtusa* lives on the trunks of the mangrove plants and comes down to muddy sediment during low tide and ascends against the plants, when the tide creeps in, whereas *C. cingulata* lives on the mud totally and *T. Telescopium* is seen buried underneath the muddy sediment. After the collection they were brought to laboratory in cool case containing dry ice and then cleaned with distilled water. The shells were broken and the soft tissue was removed and dried in hot air oven at 50°C for about 48 h. The dried samples were powdered and used for the estimation of carbohydrates by Anthrone method of Carroll *et al* [14], Proteins by Lowry *et al* [15] and lipids by Barnes and Blackstock [16]. Albumin proteins extracted with water and with potassium chloride at low ionic strength i.e., < 0.5M (0.1M, 0.2M, 0.3M, 0.4M and 0.5M) and the respective albumin proteins were estimated by the

method of Lowry *et al* [15]. Each estimation was repeated five times and the error was estimated by standard deviation.

## RESULTS AND DISCUSSION

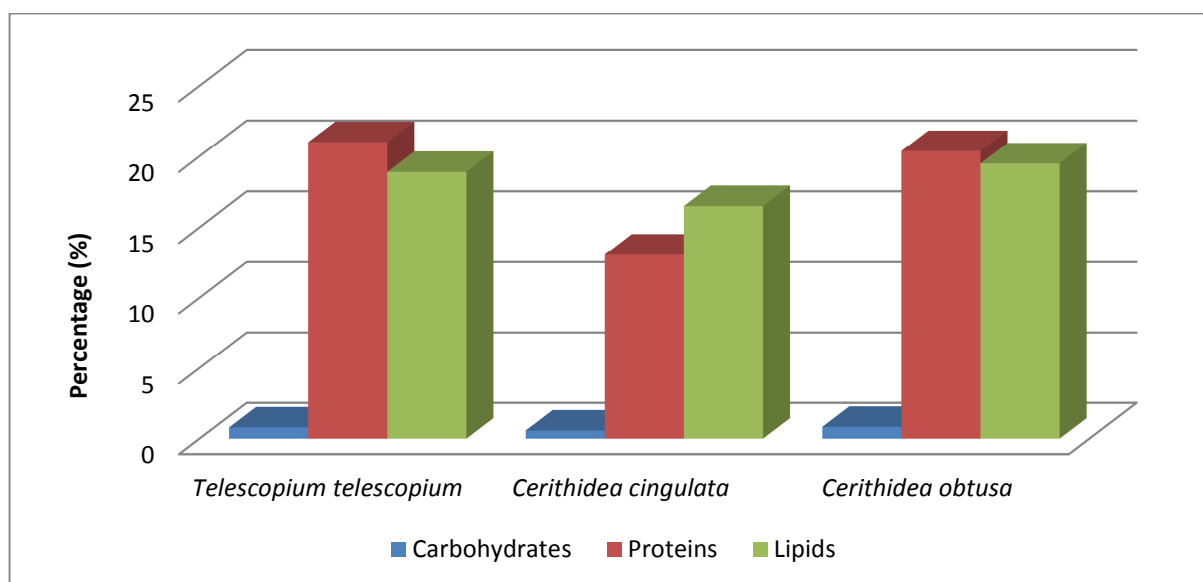
The total carbohydrates, lipids, proteins and albumin proteins estimated were presented in percentages. Carbohydrates were found to be 0.8%, 0.58% and 0.84% in *T. telescopium*, *C. cingulata* and *C. obtusa* respectively. The total protein content was 21.01% in *T. telescopium*, 13.08 % in *C. cingulata*, and 20.38 % in *C. obtusa*. Lipids were the major biochemical constituents. The total lipid levels of *T. telescopium*, *C. cingulata* and *C. obtusa* were 18.9%, 16.57% and 19.5% respectively (Fig. 1).

### Albumin Proteins

The percentage of water soluble proteins were found to be 0.01 in *T. Telescopium*, 0.04 in *C. cingulata* and 0.03 in *C. obtusa*. At 0.1M KCl concentration they were 0.13%, 0.4% and 1.71% in *T. telescopium*, *C. cingulata* and *C. obtusa* respectively. The albumins at 0.2M KCl concentration 1.39% in *T. telescopium*, 1.54% in *C. cingulata* and 1.74% in *C. obtusa*. The albumins at 0.3M KCl were recorded as 1.51%, 1.71% and 1.82% respectively in *T. telescopium*, *C. cingulata* and *C. obtusa*. The percentages at 0.4M KCl albumins were 1.72 in *T. telescopium*, 1.77 in *C. cingulata* and 1.89 in *C. obtusa*. At 0.5M KCl the albumins were 1.94% in *T. telescopium*, 2.0% in *C. cingulata* and 2.07% in *C. obtusa* (Fig. 2).

**Table 1** Biochemical composition and albumin proteins of three gastropods, *T. telescopium*, *C. cingulata* and *C. obtusa* at Bhavanapadu (Tekkali) Creek

Species	Carbohydrates (%)	Proteins (%)	Lipids (%)	Albumins					
				Water soluble Proteins	0.1M KCl	0.2M KCl	0.3M KCl	0.4M KCl	0.5M KCl
<i>Telescopium telescopium</i>	0.80	21.01	18.9	0.01	0.13	1.39	1.51	1.72	1.94
<i>Cerithidea cingulata</i>	0.58	13.08	16.57	0.04	0.4	1.54	1.71	1.77	2.0
<i>Cerithidea obtusa</i>	0.84	20.38	19.5	0.03	1.71	1.74	1.82	1.89	2.07



**Fig. 1** Biochemical composition of three gastropods, *T. telescopium*, *C. cingulata* and *C. obtusa* at Bhavanapadu (Tekkali) Creek

Biochemical composition of an organism particularly proteins and lipids in molluscs can be affected by external factors, such as temperature and food availability, or by internal factors like metabolic and other physiological activities [11, 17 & 18]. The reproductive cycle also plays a major role in the biochemical composition of the snails [19]. Similar seasonal variations in the biochemical constituents in gastropods have been observed [20].

In the present study the carbohydrates are 0.8%, 0.58% and 0.84% in *T. telescopium*, *C. cingulata* and *C. obtusa* respectively. According to Ansari *et al* [21], the carbohydrates of molluscs are mainly composed of glycogen

and changes in their level may be due to the accumulation of glycogen at different stages like gametogenesis and spawning. Carbohydrates in *Pleuroploca trapezium* have been reported as 4.3% [22]. The total free sugar levels of *Babylonia zeylanica*, *Murex virgenius*, *B. spirata* and *Trochus radiates* have been observed as 19.6%, 19.5%, 13.75% and 6.7% respectively at Kanyakumari Coast [23]. In muricid gastropod, *Thais mutabilis*, the biochemical composition of carbohydrate in gonad, digestive gland and foot have ranged from 5.18 – 15.16 % [19].

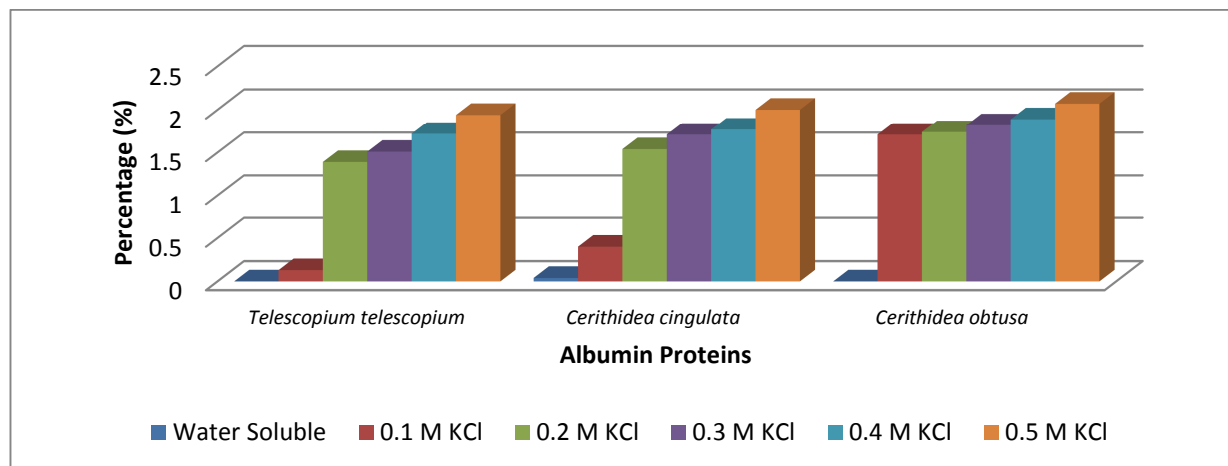


Fig. 2 Albumin proteins of three gastropods, *T. telescopium*, *C. cingulata* and *C. obtusa* at Bhavanapadu (Tekkali) Creek

The proteins in the present study are to 21.01%, 13.08% and 20.38 % respectively in *T. telescopium*, *C. cingulata* and *C. obtusa*. A maximum protein of 69.09 % has been observed in *Babylonia spirata* at Parangipettai coast. [24] and it is 10.3% in *Pleuroploca trapezium* reported at Tuticorin [22]. The percentages of total protein content in *Babylonia zeylanica*, *B. Spirata*, *Murex virgenius* and *Trochus radiatus* is 48.2%, 36.0%, 39.8% and 28.55% respectively [23]. Jasim and Ahmed [25] have observed the total protein content of 6.59-3.89 mg/g in *Unio tigridis* and 9.74-4.95 mg/g in *Viviparus bengalensis*. In *Thais bufo* the total protein content of 22.34% has been recorded at Kadiapatnam [23]. In *Thais mutabilis* the protein levels have found to be 53.86% at Tranquebar coast [19].

Fatty acid profiles of molluscs are usually dominated by polyunsaturated fatty acids [21]. In the present study the lipid levels of *T. telescopium*, *C. cingulata* and *C. obtusa* have been 18.9%, 16.57% and 19.5% respectively. In *Pleuroploca trapezium* the lipid content recorded as 1.74 % [22] and in *Thais bufo* the it is 7.67% [23]. The total lipid levels of *Babylonia zeylanica*, *B. Spirata*, *Murex virgenius* and *Trochus radiatus* are 6.2%, 1.45%, 4.7% and 1.1% respectively [5]. In *Unio tigridis* the lipids have ranged between 25.83-39.23 % and in *Viviparus bengalensis* they are 16.89- 22.66 % . [25]. Rakshit Abrol *et al* [26] have made a comparative study on the lipids and fatty acids in male and female pulmonate gastropod, *Achatina fulica* and the composition of total lipids in the organs of active male are 31.6% in albumen gland, 31% in digestive gland, 20.7% in mantle and 16.7% in foot and in case of female they are 35.02%, 25.04%, 23.17 % and 16.75% respectively.

Albumins are the soluble proteins in water and salt solutions of different ionic strengths below 0.5M. The albumin proteins showed an increase trend with the increase in the salt concentration. The percentage of water soluble proteins are 0.01 in *T. Telescopium*, 0.03 in *C. cingulata* and 0.04 in *C. obtusa*. At 0.1M KCl concentration they are 0.13%, 0.4% and 1.7% respectively in *T. telescopium*, *C. cingulata* and *C. obtusa*. The percentage of albumins at 0.2M KCl concentration recorded are 1.39% in *T. telescopium*, 1.54% in *C. cingulata* and 1.74% in *C. obtusa*. The albumins at 0.3M KCl are 1.5 %, 1.8 % and 1.81% respectively in *T. telescopium*, *C. cingulata* and *C. obtusa*. The percentages of albumin proteins at 0.4M KCl albumins are 1.72% in *T. telescopium*, 1.77% in *C. cingulata* and 1.88% in *C. obtusa*. At 0.5M KCl concentrations the albumins observed are 1.94% in *T. telescopium*, 2.0% in *C. cingulata* and 2.07% in *C. obtusa*.

Connell [10] has estimated the protein nitrogen content of 3.04mg/ml to 4.10mg/ml at 0.05I, 5.10mg/ml at 0.1I and 2.20mg/ml to 4.20mg/ml at 0.2I concentration in the muscles of the codling *Gadus callarias*. According to Chakravarty and Krishna Murthy [11] the muscle albumin proteins of males and females of three species of trachypenaeid shrimps - *T. curvirostris*, *T. sedili* and *T. pescadorensis* have shown higher values in females than the males. Chakravarty *et al* [12] have observed a significant monthly variation of albumin proteins in water and at different salt concentrations of potassium chloride in males and females of *Pampus argenteus*, *P. chinensis* and *Apolectis niger*. Ganesh and Chakravarty [13] have reported that the albumin protein

content of *Solenocera melantho* has varied as a function of sex, season with higher values in females than the males. The values of albumin fractions also showed increasing trend with the increasing salt concentrations from 0.1M to 0.5M of potassium chloride. *C. obtusa* has been showing higher values in biochemical constituents studied than *C. cingulata* and *T. Telescopium*. It may be due to its adaptability in two environments *i.e* arboreal and sediment during low tides.

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