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Harnessing the Biochemical Riches of Telescopium *Telescopium* for Human Nutrition

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ABSTRACT:

The research focuses on the biochemical composition of the gastropod *Telescopium Telescopium* from the Potamididae family , investigating its protein, carbohydrates , and lipid content. The study explores the potential uses and benefits of this species as a food source for humans.understanding its composition provides insights into its nutritional value and potential impacton human health. This research aims to determine the advantages of utilizing *Telescopium telescopium* as food and the knowledge gained from studying its biochemical makeup.

Keywords: *Telescopium Telescopium*, explores, nutritional value

1 Introduction

The meat of molluscs, especially gastropods are highly nutritious, owing to its contents of protein, rich vitamins and minerals (Thanonkaeico Benjakul and Visessanguan, 2006), Therefore, the biochemical composition of aquatic gastropod perisists an excellent nutritional assurance for millions of malnourished peoples. The gastropod meat has been considered to be free of cholesterol but contains high nutritive substances (Abdullah *et al.*, 2016; Chelladurai, 2017). Generally proximate composition means percentage composition of five basic constituents such as protein, carbohydrate, lipid, ash and water. The proximate composition varied widely depending on several factors like species size,

sex, maturity, season and feeding regimes. Information on daily dietary intake of nutrients especialy cholesterol is quite important for especially those with cardiovascular problems (Xavier, 1996; Ajaiya, 2002; Babu *et al.,* 2010). Proteins are fundamental biomolecules in all aspects of cell structure and function. An increasing demand for good quality of animal protein for the exploding population has led to effective and increasing exploitation of the aquatic resources. Carbohydrates are major sources of energy in all human diets. The ratio of carbohydrate was less when compare to the other nutrients such as proteins and lipids in animal tissues, especially in aquatic animals. Lipids can be defined as substances such as fat, oil or wax that dissolves in alcohol but not in water (Babu *et al.,* 2010). Many works have been carried out on marine, estuarine and mangrove molluscs. Biochemical composition of intertidal muricid gastropod *Thais mutabilis* in Tranquebar, coast was investigated by Kamalkanth *et al.* (2014). Seasonal variation in biochemical composition of *Villorita cyprinoides* from cochin estuary was done by Arun (2009). Myla Chakravarty *et al.* (2015) reported the biochemical composition of *Telescopium telescopium*, *Cerithidea cingulata* and *C. obtusa* from Tekkali creek of Andhra Pradesh. Nutritional importance of three potamidid snails from Bhavanapadu mangrove creek has been reported by Joseph Uday Ranjan and Ramesh Babu (2016). Roslizawati *et al*. (2016) investigated nutritional properties of three species of turban snails. Seasonal changes of reproductive cycle and proximate composition in *Cerithidea obtusa* from Ca Mau mangrove forest, Vietnam was reported by Ngo Thi Thu Thao *et al.* (2018). Muthuraman and Geetha (2018) analyzed the biochemical contents of *Xancus pyrum.* Based on the available literature, it is clearly evident that in mangrove gastropods, studies on biochemical compositions are restricted to *T. telescopium* and there is a paucity of information pentaining to the edible body components of potamididae gastropods. Hence the present study in undertaken to throw some light on biochemical composition of this gastropod in relation to sex for a period of one year from January 2018 to December 2018.

2 Material and methods

Monthly samples of about 50 to 60 specimens of *T. telescopium* were collected from Punnakayal mangrove between January 2018 to December 2018. The animals were brought to the laboratory, cleaned and were removed from the shells, separated into sexes and were dried in hot air oven at 56°C. Estimation of protein, carbohydrate and lipid were carried out in dry tissues of the animals and the values were expressed in percentage of dry weight.

Estimation of Protein

The protein content of the tissue was estimated following the method of Lowry *et al.* (1951). A known weight of tissue was homogenized with 5 ml of 10% Tricholoroacetic Acid (TCA) and 8 ml of distilled water using a tissue homogenizer, and centrifuged at 3000 rpm for 10 minutes. The supernatant was decanted. The residue was dissolved in 5 ml of 0.1 N Sodium hydroxide and kept in a water bath at 60 – 70°C for 10 minutes. From this, 0.5 ml of solution was pipetted out into a clean test tube. To this, 4.5 ml of Carbonate Copper solution (50 ml of 2% sodium carbonate + 0.5 ml of 0.5% copper sulphate + 0.5 ml of 2% sodium potassium tartarate) was added. They were thoroughly mixed well by lateral shaking. After this, the test tubes containing the solution were kept undisturbed at room temperature for 15 minutes. To this, 0.5 ml of Folin Ciocalteau phenol reagent was added. The test tubes were shaken well for uniform mixing and kept in room temperature for another 30 minutes. The resultant blue colour was read at 640 nm against a reagent blank in a UV-VIS spectrophotometer–118. The standard curve was obtained by using bovine serum albumin and the percentage of protein was calculated by following formula.

$$\text{Percentage of protein} = \frac{\text{Standard value} \times \text{OD value of the sample}}{\text{Weight of the tissue}} \times 100$$

Estimation of Carbohydrate

Carbohydrate was estimated following the slightly modified method of Seifter *et al.* (1950) using anthrone as reagent. A known weight of the tissue was homogenized with 2 ml of 10% Tricholoroacetic Acid (TCA) and 8 ml of distilled water. The homogenate was centrifuged at 3000 rpm for 10 minutes. The supernatant was collected and measured. One ml of the supernatant was taken in a clean test tube. To this, 4 ml of anthrone reagent was added and mixed well. The test tube containing the mixture was kept at room temperature. The developed colour was read at 620 nm against a standard reagent blank in a UV – VIS spectrophotometer – 118 model. The standard curve was obtained by using glucose and the percentage of carbohydrate was calculated by using the following formula.

$$\text{Percentage of carbohydrate} \quad \frac{\text{Standard value} \times \text{OD value of the sample}}{\text{Weight of the tissue}} \times 100$$

Estimation of Lipid

Lipid was estimated by following the method of Bradgon, (1951). A known weight of the tissue was homogenized well with 5 ml of chloroform solution and the solution was centrifuged at 3000 rpm for 15 minutes. The supernatant was evaporated to dryness by keeping it in an oven. Then 3 ml of 2% potassium dichromate was added which was followed by 3 ml of distilled water. The developed colour was read at 640 nm against a reagent blank in a UV – VIS spectrophotometer–118 model. The standard curve was obtained by using cholesterol and the percentage of lipid was calculated by using the formula.

$$\text{Percentage of lipid} \quad \frac{\text{Standarde value} \times \text{OD value of the sample}}{\text{Weight of the tissue}} \times 100$$

Statistical analysis

ANOVA was carried out to know the difference in levels of proximate composition between male and female.

All the data were assessed statistically by the method of one way ANOVA followed by Dunnett's t-test. p value < 0.1, p < 0.05 and p < 0.001 were considered as statistically significant.

.3 Results

The highest measured protein content in male was 40.10% in April 2018, with the lowest being 20.12% in December 2018. In females, the highest protein value 41.23% was obtained in May 2018 and the lowest 21.54% value in December 2018 (Fig. 1). In males, the highest value of carbohydrates 16.18% was recorded during April 2018 and lowest 12.11% in December 2018. In females, the greatest value 17.10% was recorded in April 2018 and the lowest 12.10% in December 2018 (Fig. 2, 3). Among male, the highest lipid value was recorded in April 2018 at 20.15%, while the smallest was recorded in December 2018 at 13.21%. In females, the highest lipid value of 21.30% was recorded in the month of April 2018 and lowest value 13.25% was recorded in the month of December 2018.

In the current investigation, the amount of protein, carbohydrate and lipids were found to be high during the month of April and it gradually decreased and the lowest values were noticed during the month of December. In general, the levels of protein,carbohydrate and lipids were higher in females than the males. During spawning period (August 2018 to December 2018), the levels were low both in males and females. There may be a correlation between the low levels seen in August and September, when spawning is common, and the high values observed throughout the breeding season.

Statistical analysis

Statistically, there is significant (≤0.05) difference among the proximate composition (protein, carbohydrate and lipid) between male and female *T.telescopium*(Table1,2&3)

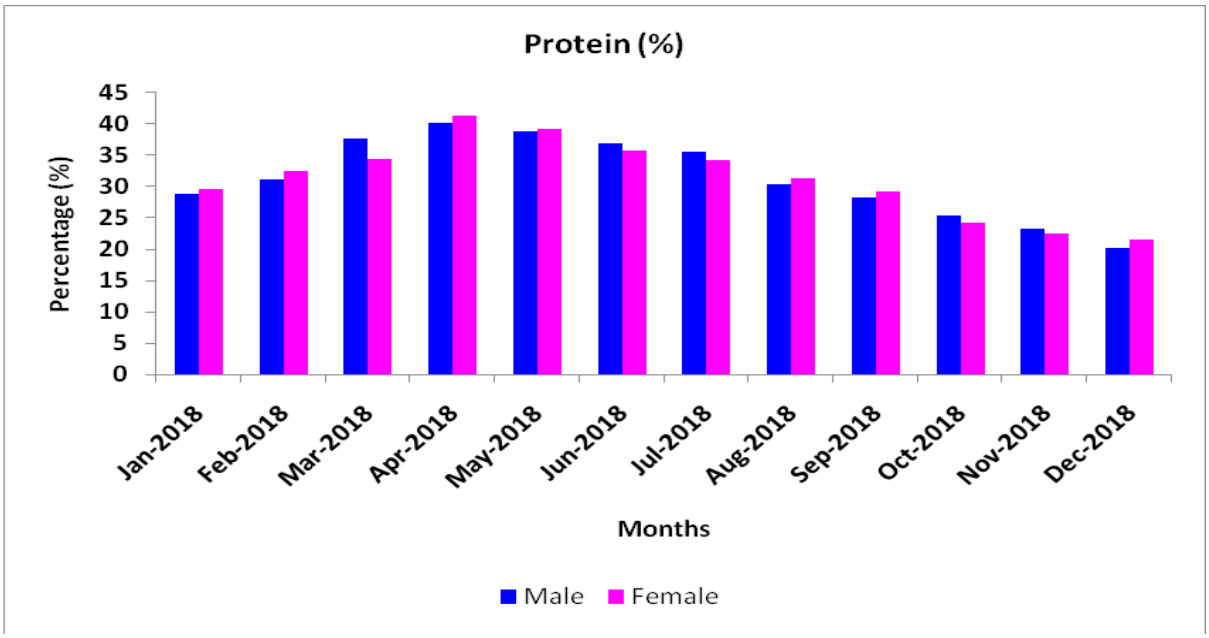

Fig. 1 : Monthly variation protein level of Male and Female *T. Telescopium*

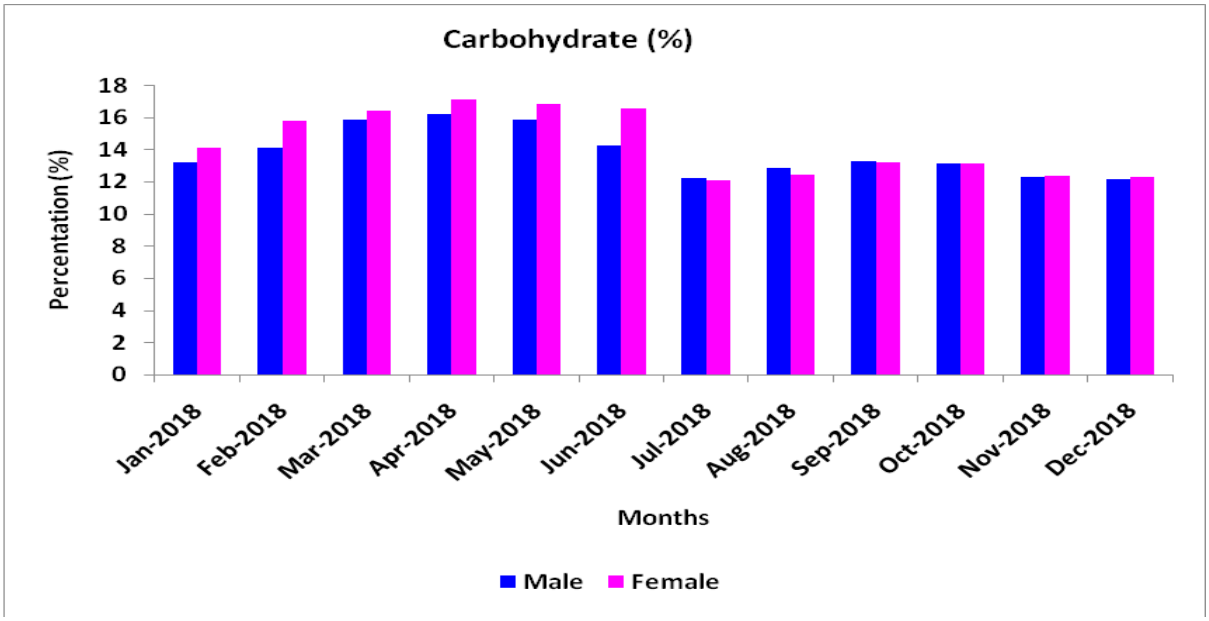

Fig. 2 : Monthly variation Carbohydrate level of Male and Female *T. telescopium*

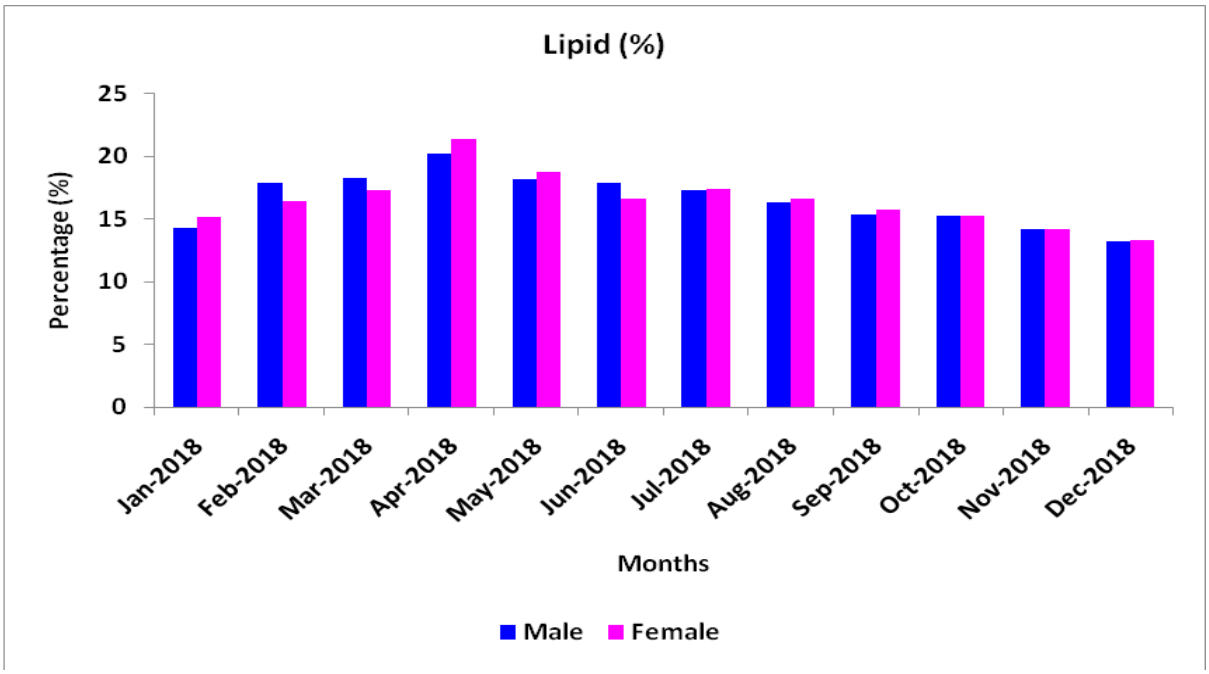

Fig. 3 : Monthly variation Lipid level of Male and Female *T. telescopium*

Table 1 : Anova – Protein (male and female *T. telescopium*)

Source of variation	SS	DF	MS	F	P-Value	F-crit
between Groups	**0.0222**	**1**	**0.0222**	**0.0015**	**0.9816**	**4.30**
with in Groups	**892.124**	**22**	**40.5511**			
Total	**892.1462**	**23**				

***significant**

Table 2 : Anova – Carbohydrates (male and female *T. telescopium*)

Source of variation	SS	DF	MS	F	P-Value	F-crit
between Groups	**1.9782**	**1**	**1.9782**	**0.6369**	**0.4334**	**4.30**
with in Groups	**68.3361**	**22**	**3.1062**			
Total	**70.3144**	**23**				

***significant**

Table .3 : Anova – Lipid (male and female *T. telescopium*)

Source of variation	SS	DF	MS	F	P-Value	F-crit
between Groups	**0.0084**	**1**	**0.0084**	**0.0019**	**0.9656**	**4.30**
with in Groups	**97.3687**	**22**	**4.4259**			
Total	**97.3772**	**23**				

***significant**

4 Discussion: In the human diet, seafood plays a significant role. Protein malnutrition is on the rise in third world nations. In turn, this has encouraged the search for alternative energy sources (Woodcock and Bekendorff, 2008). Even though snail meat is tasty and healthy, it is seldom eaten outside of impoverished coastal communities because of a lack of access. Conservative food environments of humans and a lack of information about the nutritional worth of molluscs, especially gastropods, are the primary causes of their low utilization (Palpandi *et al.*, 2010). Protein, carbohydrates, and lipids in the mangrove gastropod *T. telescopium* were found to be of high quality in this investigation. Male and female *T. telescopium* exhibited a protein range of 20.12% to 40.10% and 21.54 % to 41.23%, respectively.

The biochemical constituents observed for *T. telescopium* in the present investigation can be compared with other species of gastropods. According to Giese (1969), protein is the most important organic component in molluscs when compared to other biochemical components. Giese and Arakil (1962) suggested that the level of biochemical changes are particularly intense during the reproductive periods of *Mopalia hindsii* and *Katherina tunicata*. Results showed that the highest levels of protein content were found to be 41.23% in females and 40.10% in male.

The protein content was higher than that reported earlier in *Littorina aquadricentus* (35.94%); and Thivakaran (1988) and *Pythia plicata*, 29.8%, Shanmugam (1987). Rajendran (1985) also reported a protein range from 43.62% to 66.25% (male) and 43% to 70% (female) in *Babylonia zeylanica.* A similar observation has been made by Anandakumar (1986) who recorded the protein value of 55.90% in male and 49.70% in female of *Hemifusus pugilinus*. Thivakaran (1988) measured the highest levels of protein in *Littorin aquadricentus* and *Nodilittorina pyramidalis* at 35.94% and 35.63% respectively.

When comparing the protein content of *Thais biserialis* (42.4% in males and 43.6% in females) with *T. bufo* (46.8% in males and 49.0% in females), (Tagore, 1989) it is clear that the latter species is more protein-dense. Maximum protein concentration of 41.2% was found in *B. spirata* by Jeyanthi and Govindarajulu (2016). Protein content in three turbinid snail species was found to be rather high by Lah *et al.* (2017); these included *T.militaris,L.undulata*,and *L. torquata*. High levels of protein, between 18.62% and 24.09%, have been found in the sea snail *R. venosa* (Popova *et al.*, 2017). Similarly to the previous research, the current study found that male and female *T. telescopium* had the highest protein levels, at 40.10% and 41.23%, respectively.

According to research conducted by Darwin *et al.*, 2017 the protein content of *Purpura bufo* was measured to be 22.45%. *L. turturella*, a sea gastropod, had 44.66% protein by dry weight (Abdullah Rasyid and Safar Dody, 2018). Similar to previous research, this study showed that protein concentrations in bodily tissues were elevated and showed seasonal change. Therefore, *T. telescopium* is highly suggested for consumption by humans as it may be a source of nutritional value. Carbohydrate levels were consistently lower than those of protein and lipids. Carbohydrate concentrations in male varied from (12.11% to 16.18%) and in female, from (12.26% to 17.10%). Carbohydrate levels were typically lower than those of fat and protein. Among female *Cellana radiata*, the highest documented value of carbohydrate was (11.6%) (Suryanarayanan and Nair, 1976), whereas the highest value among male *Cellana radiata* was 9.2% (Patil and Mane, 2004).

Carbohydrate content varied between (4.70%) and (12.1%) in male and (3.2%) and (9.5%) in female *H. pugilinus*, according to research conducted by Anandakumar *et al.* (1986). Maximum carbohydrate levels were found in *Littorin aquadricentus* (5.31%) and *Nodilittorina pyramidalis* (4.69%), as narrated by Thivakaran (1988). Carbohydrate levels varied from (6.0% to 12.8%) in *Thais biserialis* and from (7.2% to 13%) in Thais bufo as reported by (Tagore, 1989). Carbohydrate content in *Lambis lambis* ranges from (9.90% to 14.09%) in males and (8.41% to 15.3%) in females, as described by Baskara (2001). The precedent results are consistent with the current investigation.

The current research found that carbohydrates made up the smallest proportion of the total. Based on this analysis, the carbohydrate content of male *T. telescopium* ranged from (12.11% to 16.18%), while that of females went from (12.26% to 17.18%). This was a smaller percentage than what had been found in earlier studies of other gastropods, such as *P. bufo* 20.3% (Darwin *et al.,* 2017), *B. spirata* 53.86% (Periyasamy *et al.,* 2011), *B. zeylanica* (19.6%); *C. virginica* (19.5%); and *B. spirata* (13.75%) (Margret *et al.,* 2013).

***T. telescopium* males had a lipid content of 20.15% in April 2018 and 13.21% in December 2018. Lipid levels in females ranged from 21.30% in April 13.25% in December 2018. Lipids are considered to be a very potent fuel source as the have twice the energy of carbohydrates and protein. Lipids are also an excellent food source that may help you get the vital fatty acids your body needs for healthy development (Ponnusami, 1997). Thivakaram, (1988) found that *Littorina aquadricentus* had a lipid value of 0.76%. *Cellana radiata* lipid levels varied between 0.8% and 10.75% (Suryanarayanan and Nair, 1976). *H. pugilinus* was found to have a fat content anywhere from 15.0% to 23.6%, according to research conducted by Anandakumar (1986). Compared to *R. rapiformis* (0.85% to 2.12% in male and 0.95% to 2.96% in female; Rajkumar, 1995), the range of lipid levels obtained in the current research was greater for males (13.2% to 20.15%) and females (13.25% to 21.30%).**

Recent research has shown that the mangrove gastropod *T. telescopium* is a valuable source of protein. *T. telescopium* stood out as the top choice due to its high protein content and low fat content. Maximum values of biochemical components were recorded during breeding season and minimum values were recorded during spawning season in both sexes, suggesting that the greater feeding capacity of female *T. telescopium* is responsible for the higher biochemical content of their body tissues compared to males.

One possible explanation is that during the mating season, in addition to producing and maturing gametes, they consume a large amount of food. So far, the health benefits of eating mangrove gastropods have not been highlighted, and so, there has been little interest in this nutrient-dense food source. Based on the results of this research, it is evident that the body tissues of gastropods, and specifically *T. telescopium*, have high nutritious value and may be utilised as a substitute for ordinary marine food to provide nutrients for both growing children and those with malnutrition.

REFERENCE

Abdullah, A, Nurjanah, N, Hidayat, T & Gifari, A, 2016, 'Characterize fatty acid of *Babylonia spirata, Meretrix meretrix*, *Pholas dactylus'*, International Journal of Chemical and Biomolecular Science, vol. 2, pp. 38-42.

Abullah, R, Smith, J, Savins, D, Dowell, A, Bucher, D & Benkendorff, K, 2018, 'Investigation of nutritional properties of three species of marine turban snails for human consumption', Food Science & Nutrition, vol. 5, no. 1, pp. 14-30.

Ajaya Bhaskar, D, 2002, 'Nutritional evaluation of molluscan seafood', Ph.D. Thesis, Annamalai University, India, p. 25 - 56.

Arun, AU, 2009. 'An assessment on the influence of salinity in the growth of black clam (*Villorita cyprinoides)* in cage in Cochin estuary with a special emphasis on the impact of Thanneermukkom salinity barrier', Aquac Aquar Conserv Legis Int J Bioflux Soc. vol. 2, no. 3, pp. 319–330.

Babu, A, Kesavan, K, Annadurai, D & Rajagopal, S, 2010, '*Bursa spinosa*-A Mesogastropod fit for human consumption', Advance Journal of Food Science and Technology, vol. 2, no. 1, pp. 79-83.

Baskara Sanjeevi, S, 2001, 'Studies on eco-biology of the spider conch *Lambis lambis* (Linne, 1758) (Gastropoda: Prosobranchia: *Strombidae*) from the Mandapam waters, South east coast of India', Ph.D., Thesis, Annamalai university, India.

Chelladurai, G, 2017, 'Influence of diets on growth and biochemical parameters of *Babylonia spirata* Geology, Ecology, and Landscapes', vol. 1, Issue 3, pp. 162-166

Darwin, C, Suneetha K & Kavitha K, 2017, 'Studies on biochemical composition of marine gastropod *Purpura buto* off Visakhapatham coast', International Journal of Recent

Giese, AC, & Araki, G, 1962, 'Chemical changes with reproductive activity of *Chitons Katherina tunicate* and *Mopalia hindsii*', Journal of Experimental Zoology, vol. 151, pp. 259-67.

Joseph Uday Ranjan, T & Ramesh Babu, K, 2016, 'Heavy metal risk assessment in bhavanapadu creek using three potamidid snails-*Telescopium telescopium, Cerithidea obtusa* and *Cerithidea cingulata*', J Environ Anal Toxicol, vol. 6, p. 385.

Kamalkanth, S, Christy Ponni, Muniyan, M & Chandravathani, S, 2014, 'Biochemical composition of intertidal *muricid* gastropod *Thais mutabilis* (Link) in tranquebar, Nagapattinam district, Southeast coast of Tamilnadu India', International Journal of Modern Research and Reviews, vol. 2, issue 1, pp. 8-14.

Lah, RA, Smith, J, Savins, D, Dowell, A, Bucher, D & Benkendorff, K, 2017, 'Investigation of nutritional properties of three species of marine turban snails for human consumption', Food Science & Nutrition, vol. 5, no. 1, pp. 14-30.

Margret, MS, Santhiya, M, Mary, MT & Jansi, M, 2013, 'Comparative study on the biochemical composition of four gastropods along the Kanyakumari coast', World Journal of Fish and Marine Sciences, vol. 5, no. 6, pp. 637-640.

Myla Chakravarthy, S, Amarnath, D, Shanthi Sudha, B & Ganesh, 2015, 'Biochemical composition of three Potamidid snails *Telescopium telescopium, Cerithidea cingulate* and *C. obtusa* of Tekkali Creek (Bhavanapadu Mangroves), Andhra Pradesh, India', Advances in Applied Science Research, vol. 6, no. 10, pp. 50-53.

Palpandi, C, Vairamani, S & Shanmugam, A, 2010, 'Proximate composition and fatty acid profile of different tissues of the marine neogastropod *Cymbium melo* (Solander, 1786)' Indian J. Fish, vol. 57, no. 3, pp. 35-39.

Periyasamy, N, Murugan, S & Bharadhirajan, P, 2014, 'Biochemical Composition of marine bivalve *Donax incarnates* (Gmelin, 1791) From Cuddalore Southeast coast of India', IJAPBC., vol. 3, no. 3, pp. 575-582.

Ponnusami, R, 1997, 'Practical guide to shrimp farming', Palani Paramount Pubn., Palani, India, pp. 159.

Ponnusamy, K, Kamala, K, Munilkumar, S & Pal, AK, 2016, 'Antioxidant properties from tissue extract of cephalopods around Madras atomic power station, Kalpakkam Coast', International Journal of Pharma esearch and Health Sciences, vol. 4, no. 2, pp. 1086-1091.

Popova, T, Stratev, D, Vashin, İ, Zhelyazkov, G, Valkova, E & Dospatliev, L, 2017, 'Seasonal Changes in the Quality and Fatty Acid Composition of Meat in Rapa Whelk (*Rapana venosa*) from the Bulgarian Black Sea Coast', Türk Tarım ve Doğa Bilimleri Dergisi, vol. 4, no. 3, pp. 277-283.

Rajendran, A, 1985, 'Studies on the toxin of ivory shell *Babylonia zeylonica* (Bruccuere) (Mollusca: Gastropoda: Buccinidae) from Cuddalore Coast', M. Phil, Thesis, Annamalai University, India, pp. 1-59.

Shanmugam, A, 1987, 'Studies on *Pythia plicata* (Gray) (Gastropoda: Pulmonata: Ellobiidae) From Pichavaram mangroves. Ph.D. Thesis, Annamalai university, India, p. 127.

Suryanarayanan, H & Nair, NB, 1976, 'Seasonal variation in the biochemical constituents of *Cello naradiata* (Born)', Ind. Mar. Sci., vol. 5, pp. 126-128.

Tagore, J, 1989, 'Studies on the Thaisids *Thais biserialis* (Blainville, 1832) and Thais bufo (Lamarck) (Gastropoda: Prosobranchia Thaisidae) from the rocky shore (Southeast

Coast of India)', Ph.D. Thesis, Annamalai university, India, pp. 212.

Thivakaran, GA, & Kasinathan, R, 1988, 'Studies on the biology of the dog-whelk Nassastolata (Gmelin) of Portonovo waters', CMFRI Bulletin, vol. 42, no.1, pp. 116-125.

Woodcock, S & Benkendorff, K, 2008, 'The impact of diet on the growth and proximate composition of juvenile whelks, Dicathais orbita (Gastropoda: Mollusca)', Aquaculture, vol. 276, no. 1-4, pp. 162-170.

Xavier, RM, 1996, 'Studies on the biochemistry and processing of edible meat of muricid gastropods *Chicoreus virgineus* (Roding, 1798) and *Rapana rapiformis* (Born, 1778)', Ph.D Thesis, Annamalai University, India, p. 88.