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Biochemical Composition of Some Commercially Important Marine Gastropods from Tuticorin Coast, South East Coast of India

G Chelladurai[1]* and G Moorthy[2]

[1]PG and Research Departemnt of Zoology, V.O.Chidambaram College, Tuticorin,Tamil Nadu, India

[2]PG and Research Department of Geology, V.O.Chidambaram College, Tuticorin,Tamil Nadu, India

***Corresponding Author:** G Chelladurai, PG and Research Departemnt of Zoology, V.O.Chidambaram College, Tuticorin,TamilNadu, India.

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Abstract

This proximate study was carried out to determine the nutrient content of four commercially important marine molluscs. The selected molluscan species are *Lambis lambis*, *Chicoreus ramosus, Babylonia spirata* and *Xancus pyrum* were collected from Tuticorin coast. These species were assessed for their proximate composition, amino acids, fatty acids and FTIR spectrum designed to establish their nutritive values on the dry weight basis. The analysis of muscles revealed that the composition of crude protein varied from 38.41% in *L. lambis* to 40.69% in *X. pyrum*, moisture content varied from 89.6% in *L. lambis* to 92.78% in *X. pyrum* and in case of ash content it varied from 0.94% in *B. spirata* to 1.66% in *X. pyrum*, Carbohydrate content varied from 17.5% in *L. lambis* and 19.21% in *B. spirata*. The fat content varied from 2.89% in *B. spirata* and 4.16% in *C. ramosus*. The amino acids composition exhibited maximum was noticed in *X. pyrum* and minimum was noticed in *B. spirata.* In fatty acid composition of four gastropods showed moderately distrusted in their bodies. The FTIR analysis of four gastropods represents the presence of alkyl halides, aliphatic amines, aromatic amines, alkanes, amines, alcohols and phenols compound. The results show that all the nine gastropods contain good sources of protein and other biochemical constituents and can be used for edible purposes to prevent starvation.

Keywords: *Marine Gastropods; Proximate Composition; Amino Acids; Fatty Acids; FTIR; Tuticoirn Coast*

Introduction

The gastropods are by far the largest group of molluscs and compose of about 80% of the phylum. The size, body and shell morphology as well as habitat of gastropods very significantly from one species to another. Molluscs can are one of the earliest recorded group of living organism. Their presence on planet earth since the Paleozoic era 540 million years ago has been proved beyond doubt. Abundance a size and diversity and their dual roles as predators and prey make molluscs an indispensable component of tropical marine ecosystems. With more than 80,000 species, the phylum Mollusca was second only to the phylum arthropod. From India, a total of 3271 species of molluscs belonging to 220 families and 591 genera have been documented and of these 1900 are gastropods, 1100 bivalves, 2210 cephalopods, 41 polyplacophorans and 20 scaphopods [1]. The Indian Babylon, species has a very smooth shell with high spire, rounded whorls slightly impressed sutures and a large ovate body whorl. Though the shell bears distinctive brownish patches on white background. The major characteristic is the violet staining at the fascicle. The species distribution in Indian and Sri Lankan waters. 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 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 on biochemical composition of any edible organisms was extremely important since the

nutritive value was reflected in its biochemical contents [2]. The consumption of marine molluscs provides an inexpensive source of protein with a high biological value, essential minerals and vitamins. The molluscs are considered as a low fat, high protein affect food texture and food flavour. The quality of protein is usually assessed by its amino acid composition. The amino acid composition in turn is helpful in assessing the nutritive value of an organism [3]. Utilization of molluscs as source of food especially for coastal community in Indonesia has increased rapidly. The protein from fish meal is most suitable for snail feed, due to its high cost; adequate substitution of this ingredient will significantly reduce operating cost in aquaculture farms [4]. The molluscs are one of the most delicious and protein rich food among the sea foods. Moreover, they serve as cheep of food, raw material for cottage industries [5]. The bioactive components of marine mollusks provide a variety of metabolites, and some of which can be used for drug development [6]. The shellfish proteins are rich in essential amino acids, which are required for the growth, reproduction and synthesis of vitamins. In. aquatic animal fats are good sources of essential fatty acids that are not synthesized in the human body. The fatty acids have a very distinctive character compared to fatty acids from other sources. They consist not only essential fatty acids, but also a significant source of omega-3 fatty acids, especially Eicosapentaenoic Acid (EPA, C20:5n3) and Docosa Hexanoic Acid (DHA, C22:6n3). These fatty acids play a vital role in human nutrition disease prevention and health promotion [7].

The consumption of molluscs and shellfish is considerably low, but the amount of fatty acid and the proportions of saturated, monounsaturated and polyunsaturated fatty acids in shellfish contribute to a healthy diet. Shellfish also contain significant amounts of "good" fats called Omega-3 fatty acids and also provide high quality protein with all the dietary essential amino acids for maintenance and growth of the human body [3]. Factors such as water temperature, nutrient availability and reproductive cycle of mollusc can influence the biochemical composition [8,9]. Hence, the present study has been made on attempt to estimate the proximate composition of four economically important marine gastropods through estimating their major biochemical Composition such as total protein, carbohydrate and lipid content, fatty acid profile and amino acid profile in the whole-body tissue.

Materials and Methods

Collection of samples

The gastropods such as *Lambis lambis, Chicoresus ramosus, Babylonia spirata* and *Xancus pyrum* were collected from trawl net by catch at the fish landing center of Tuticorin coast southeast coast of India. The collected samples were transported to the laboratory in and identified by standard keys provided (Adoni, 1985). They were washed to remove impurities and dusts by using distilled water and the outer shells were carefully removed and dissected out and dried in hot air oven at 40 °C for 48h. The dried material was powdered, sieved and used for the estimation of proximate analysis.

Estimation of moisture

The estimation of moisture content of sample was estimated by following the method of AOAC [10]. 10g of mined meat sample was spread uniformly in a dish and heated in a hot air oven at 100°C for about 12 hours. Then it was cooled and weighed. Repeated heating, cooling and weighing was done until the difference in weight between 2 successive readings showed less than 1 mg. Then the moisture content in percentage was calculated using the following formula.

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

Estimation of protein

The estimation of protein content of dried tissue samples was followed by Lowry., *et al* (1946). 5g of the sample was grinded well with mortar and pestle with 5 ml of distilled water, centrifuged and the supernatant was use'd for protein estimation. Pipetted out 0.2, 0.4, 0.6, 0.8 and 1 ml of the working standard into a series of test tubes. Pipette out 0.1 and 0.2 ml of the extract into 2 more test tubes. Made up to the volume to 1 ml in all the test tubes with distilled water. Pipette out 1 ml distilled water into another test tube as blank. Add 5 ml of

analytical reagent to all the tubes. Mixed well and allowed to stand for 10 minutes. Then 0.5 ml of Folin ciocalteu reagent was added and mixed well. Then it was allowed to stand at room temperature in dark for 30 minutes. Measured the absorption of the colour developed at 660 nm in the spectrophotometer.

$$\% \text{ composition of protein} = \frac{\text{standard value} \times \text{OD of sample}}{\text{weight of tissue}} \times 100$$

Estimation of carbohydrate

The estimation of total carbohydrate content was followed by Dubois., *et al.* [11] using phenol-sulphuric acid method. 5 mg of oven-dried tissue was taken for carbohydrate in a test Tube and 1 ml of phenol (5%) and 5 ml of concentrate H_2SO_4 added in quick succession. The tubes were kept for 30 minutes at 30°C and the optical density (OD) of the colour developed was measured at 490 nm against the blank. D-glucose was used as a standard and it had an optical density value of 0.1% composition of carbohydrates was calculated by using the following formula.

$$\% \text{ composition of carbohydrate} = \frac{\text{Standard value} \times \text{OD of sample}}{\text{Weight of tissue}} \times 100$$

Estimation of lipids

The estimating lipids content of sample were analyzed by Folch., *et al* [12]. 1 gm of tissue was homogenized in 20 ml of chloroform - methanol mixture at 2:1 ratio. It was then left undisturbed for 2 hrs in the dark and then filtered through a Whatmann No. 1 filter paper and preserved. The residue was restricted, and the half of the original volume of the same solvent was filtered. Both the filtrates were cooled, and the total volume was noted. To the filtrate, 1/5 the volume of 0.6% saline was added and the mixture was transferred to a separating funnel and left undisturbed overnight in the dark. The lower layer was carefully taken out from the separating funnel in a pre - weighed beaker and 4 ml of benzene and 8 ml of ethanol were added. This mixture was evaporated to dry at room temperature. After total evaporation, the beaker was weighed again and from the difference, the weight of the lipid in the sample was calculated. After total evaporation, the beaker was weighed again and from the difference, the weight of the lipid in the sample was calculated.

Estimation of ash

The estimation of Ash content of sample was followed by 12g of the sample was taken in a silica dish and ignited with the flame of the burner for about an hour to smoke off excess moisture, fat etc. Then sample was transferred into the muffle furnace and ignited at 550ºC until the formation of white ash (Nearly 16 hours). Then it was cooled in a desiccator and weighed. Igniting, cooling and weighing was repeated until the difference between the two successive weight was less than 1 mg. Using the lowest weight and the ash content was calculated.

Estimation of amino acids

The estimation of Amino acid content was followed by Baker [13]. 100 mg of tissues were dried at 60°C for 24h in an oven and they were packed in airtight polyethylene covers and kept in desiccators. The oven dried samples were finely grounded before estimating amino acid profile. Amino acids were estimated in HPLC-Lachrome merck in SPD-10A VP Detector.

Estimation of fatty acids

The fatty acid composition analysis was followed by the method of Babu., *et al* [14]. Tissue samples were oven dried at 70°C for 24h until no more weight reduction was observed. After that, it was grounded finely with pestle and mortar. To the 100 mg to 200 mg of finely ground tissue samples, 2 ml of chloroform and methanol (1:1 ratio) was added and kept a side for 30 seconds. Then the residual matter was removed through filtration with the what man no:1 filter paper (125 mm). After that, it was subjected to washing with 1ml of

chloroform and methanol (2:1 ratio) for removing the inorganic substance. Next, the extracts were treated with chloroform: methanol: water (8:4:3) where, residual phase were evaporated to dryness. Then the dried matter was sealed in a test tube with 3% methanolic HCl and stored at 80°C for 18h. To this 2 ml of hexane was added for extraction of the fatty acid ethyl esters from the methanol by hexane. 1 ml of the supernatant containing hexane phase was collected in a micro vessel. After which, the residual fraction was dissolved in the ratio 10:1 of with ethyl acetate and 1:1 aliquot of which was injected into a gas chromatography (Agilent 6890, 1997) equipped with flame identification detector and column HP ULTRA -2 (25m, 0.2 mm 1D).

Result

Estimation of total protein

The percentage of total protein content was estimated in *Lambis lambis, Chicoreus ramosus, Babylonia spirata* and *Xancus pyrum* was observed to be 38.41%, 39.41%, 40.23%, 40.65, respectively. It was found to be maximum in *X. pyrum* and minimum in *L. lambis* (Figure 1-4).

Estimation of total free sugar

The total free sugar level in *Lambis lambis, Chicoreus ramosus, Babylonia spirata* and *Xancus pyrum* were observed to be 17.5%, 18.26%, 19.21%, and 18.97% respectively. It was found to be maximum *B. spirata* and minimum *L. lambis* (Figure 1-4).

Estimation to fat

Next to carbohydrates, lipids are the major biochemical constituent in gastropods. The total lipid level of *Lambis lambis, Chicoreus ramosus, Babylonia spirata* and *Xancus pyrum* 3.1%, 4.16%, 2.89% and 3.3% respectively. Total lipid content was also found to be high in maximum *C. ramosus* and minimum in *B. spirata* (Figure 1-4).

Estimation of water content

Moisture content is one of the most important biochemical constituents of gastropods. The moisture content in the body tissues of four studied gastropods; *Lambis lambis, Chicoreus ramosus, Babylonia spirata* and *Xancus pyrum* were 89.6%, 90.33% respectively (Figure 1-4).

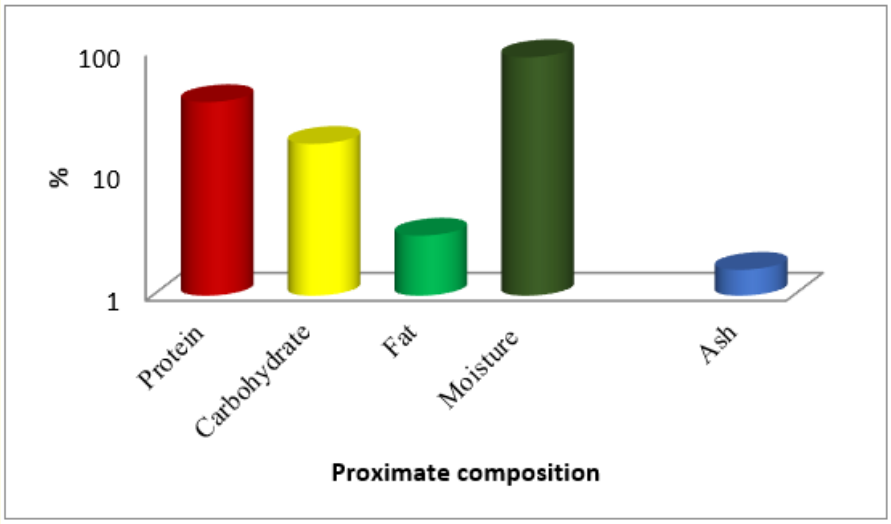

Figure 1: *Showing the proximate compound of Lambis lambis.*

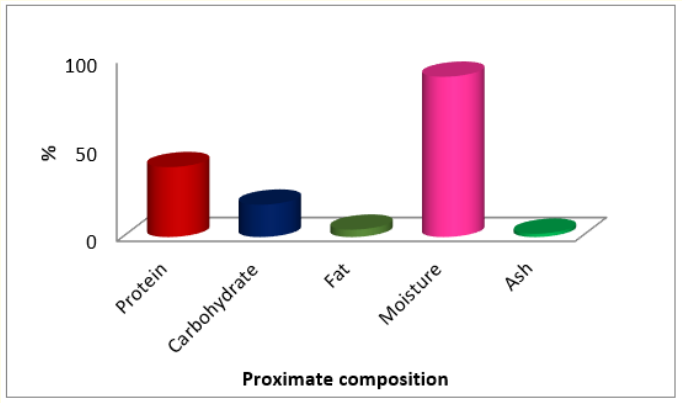

Figure 2: *Showing the proximate compound of Chicoreus romosus.*

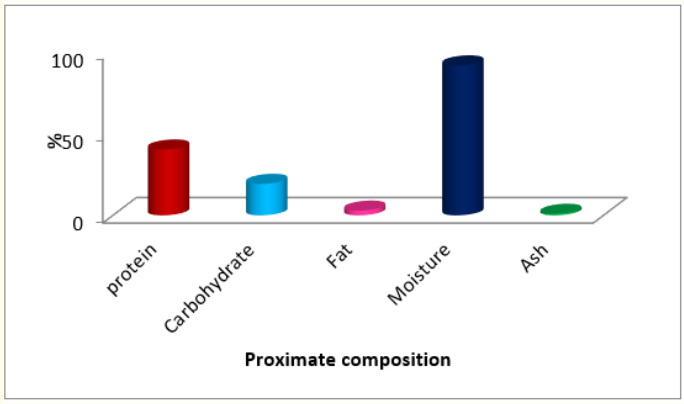

Figure 3: *Showing the proximate composition of Babylonia spirata.*

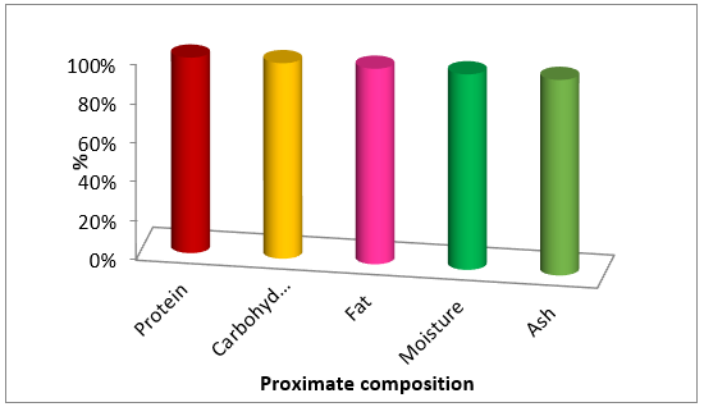

Figure 4: *Showing the proximate composition Xancus pyrum.*

Estimation of ash

The ash content of the gastropods was very less which is about 0.94% in *B. spirata* followed by 1.87% in *C. ramosus* 1.66% in *X. pyrum* and 1.63% in *L. lambis* (Figure 1-4).

Amino acids profile of *Lambis lambis*

The amino acid profile of *L. lambis* is depicted in figure 5 and 6. Totally, 12 were detected. Among them six were essential and six were non-essential amino acids, the total percentage composition of essential and non-essential amino acids was found to be 5.09% and 5.19% respectively. Higher percentage of essential amino acid was contributed by Isoleucine (1.96%) followed by histidine, valine and leucine showed the lowest concentration.

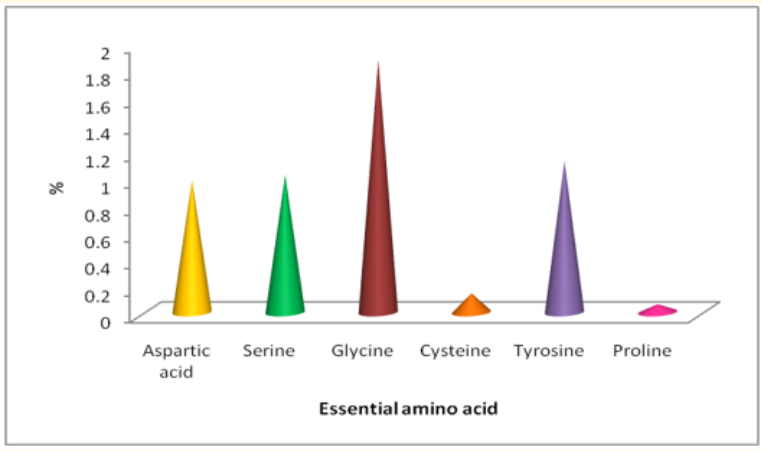

Figure 5: *Showing the essential amino acid profile of Lambis lambis.*

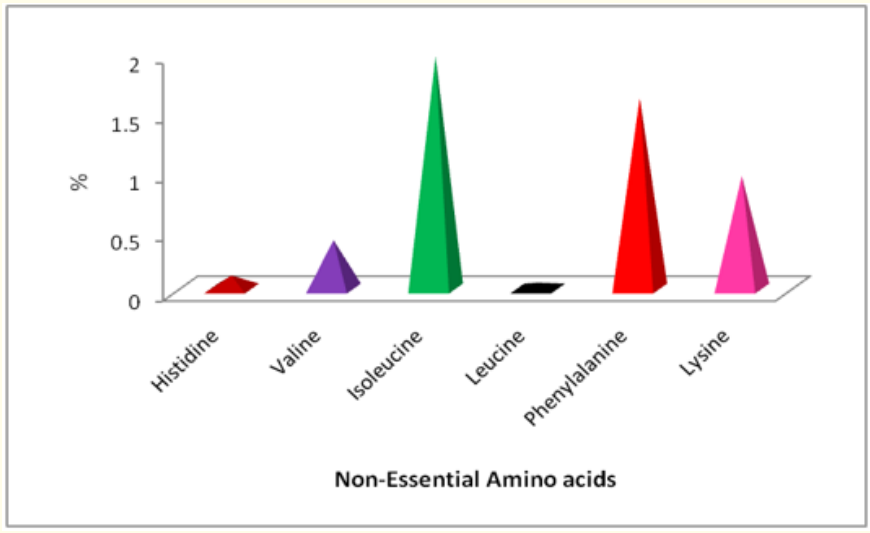

Figure 6: *Showing the non-amino acid profile of Lambis lambis.*

Amino acids profile of *Chicoreus ramosus*

The amino acid profile of *C. ramosus* is depicted in figure 7 and 8 the total percentage composition of essential and non-essential amino acids was found to be 6.15% and 3.39% respectively. Higher percentage of essential amino acid was contributed by Isoleucine (0.493%) followed by histidine, valine and phenylalanine showed the lowest concentration.

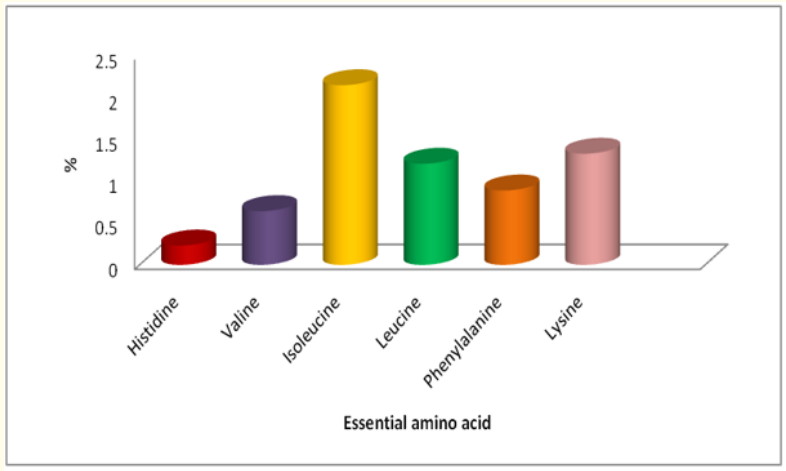

Figure 7: *Showing the essential amino acid of Chicoreus romosus.*

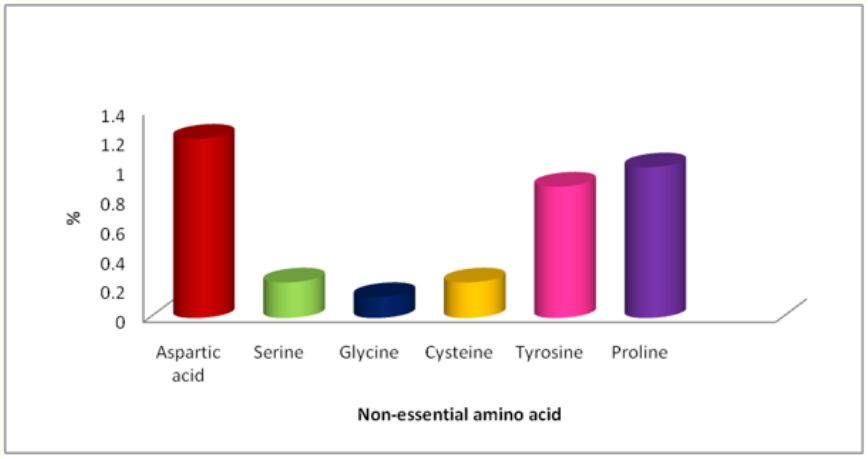

Figure 8: *Showing the non-essential amino acid of Chicoreus romosus.*

Amino acids profile of *Babylonia spirata*

The amino acid profile of *B. spirata* is show in figure 9 and 10 among them ten were essential and ten were non-essential amino acids. The percentage composition of essential and non-essential amino acids was found to be 4.82% and 4.17% respectively. Higher percentage of essential amino acid was contributed by isoleucine (1.77%) followed by Isoleucine, and valine showed the lowest concentration.

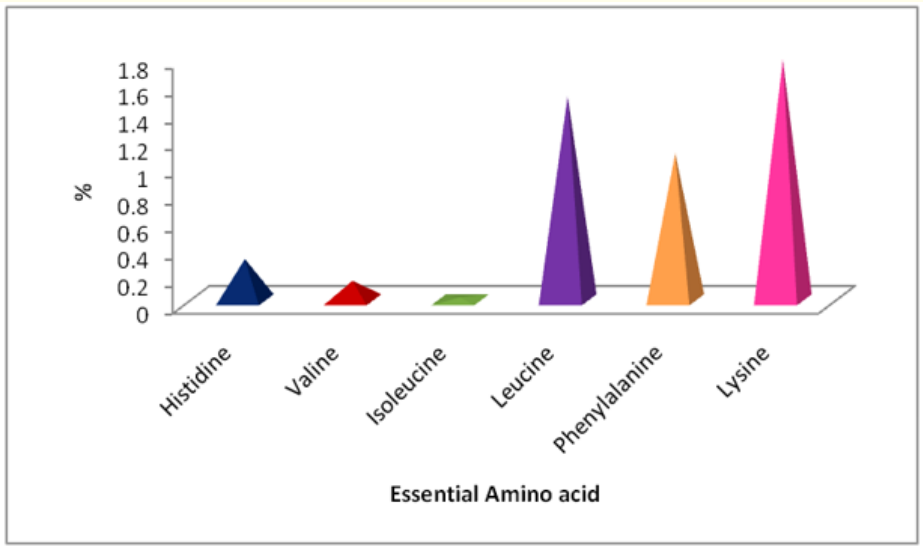

Figure 9: *Showing the essential amino acid of Babylonia spirata.*

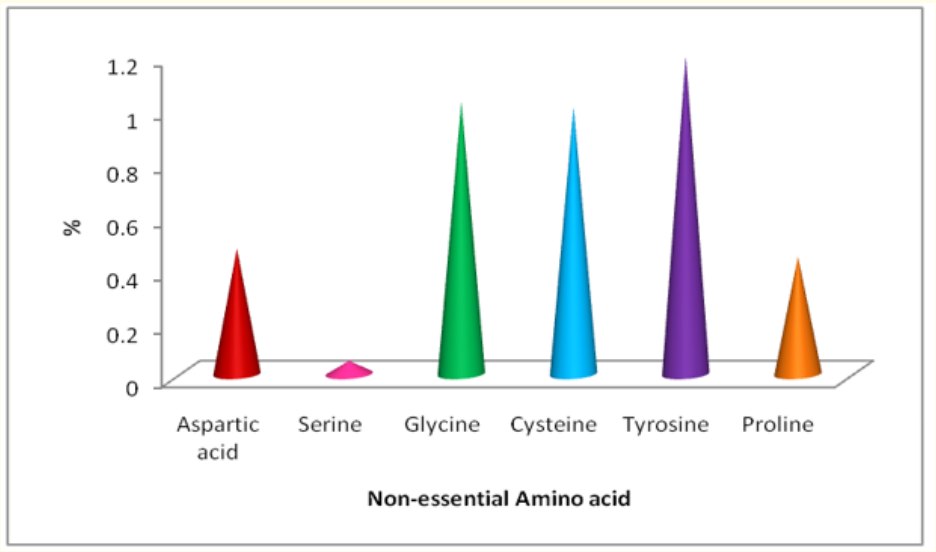

Figure 10: *Showing the non-essential amino acid of Babylonia spirata.*

Amino acids profile of *Xancus pyrum*

The amino acid profile of *Xancus pyrum* is show in figure 11 and 12. The total percentage composition of essential and non-essential amino acid was found to be 5.53% and 5.13% respectively. Higher percentage of essential amino acid was contributed by (1.89%) followed by Phenylalanine. Isoleucine and valine showed the lowest concentration.

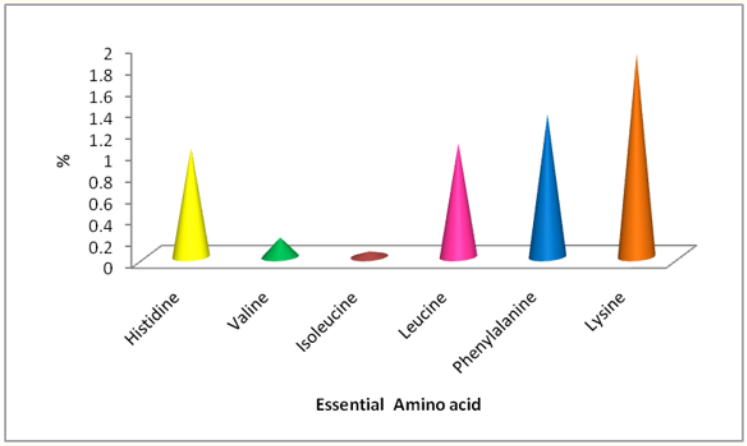

Figure 11: *Showing the essential amino acid of Xancus pyrum.*

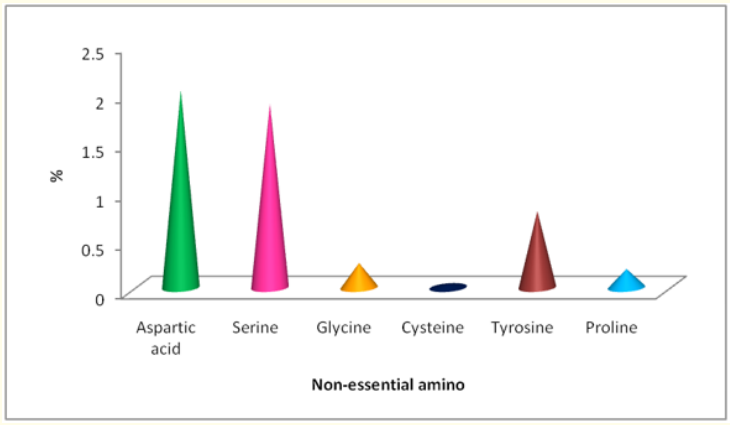

Figure 12: *Showing the non-essential amino acid Xancus pyrum.*

Estimation of fatty acids

The analysis of fatty acid composition revealed the three groups of fatty acids in these selected gastropods viz. Saturated Fatty Acids (SFA), Monounsaturated Fatty acids (MUFA), Poly unsaturated Fatty acids (PUFA). In mollusc, *L. lambis* maximum was observed in PUFA (2.01%) and minimum was observed in MUFA (1.02) (Figure 13). In molluscs *C. ramosus* were maximum noticed in SFA (2.49%) and minimum was noticed in MUFA (1.89%) (Figure 14). In molluscs *B. spirata* was maximum was noticed in PUFA (2.58%) and minimum was observed in MUFA (1.23%) (Figure 15) and *X. pyrum* was maximum in SFA (2.87%) and minimum in MUFA (1.01%) (Figure 16).

FTIR spectrum analysis

The *L. lambis* tissue exhibited the characteristic absorption peaks were showed range from 3443.56 cm^{-1} to 467.68 cm^{-1} (Table 1). The functional groups are N-H symmetric (Amines), =C-H stretch (Alkenes), O-H stretch (Carboxylic Acids), C=O stretch (Acyl Chlorides), Ring C=C stretch (Aromatic Compound), =C-O-C sym (Ethers), C-H bend (Aromatic Compound), C-Br stretch (Alkyl halides) (Figure 17).

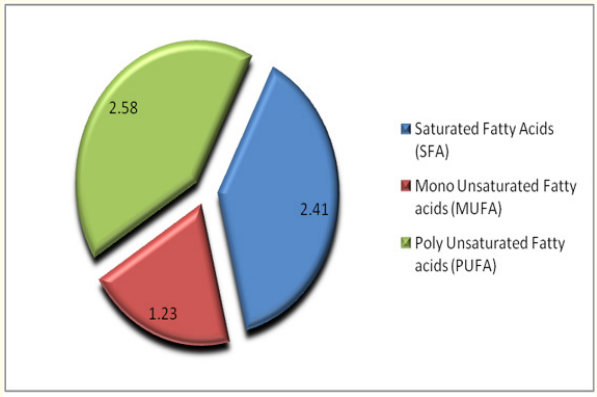

Figure 13: *Showing the fatty acid profile of Lambis lambis.*

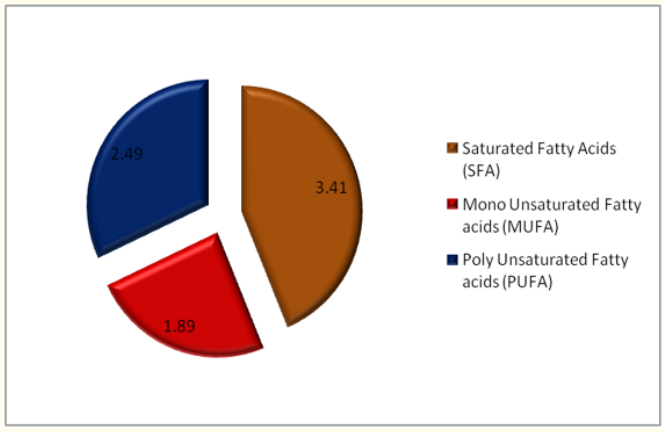

Figure 14: *Showing the fatty acid profile of Chicoreus ramosus.*

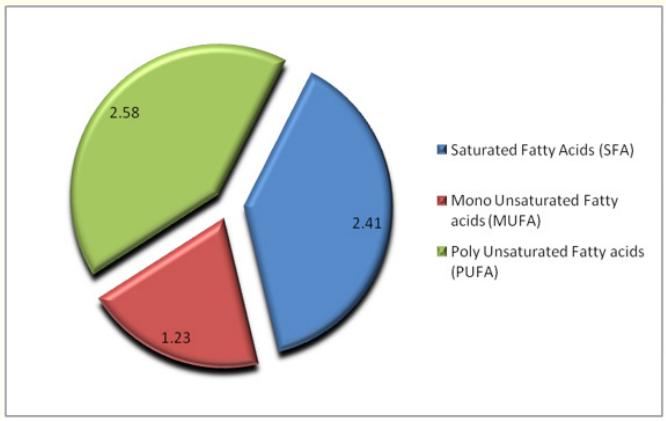

Figure 15: *Showing fatty acid profile of Babylonia spirata.*

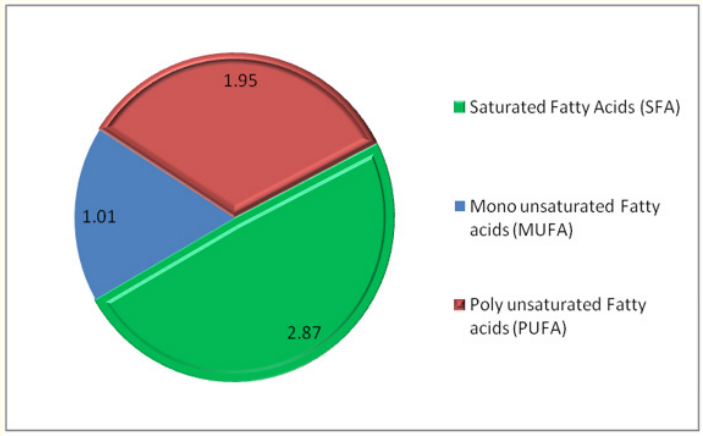

Figure 16: *Showing the fatty acid profile of Xancus pyrum.*

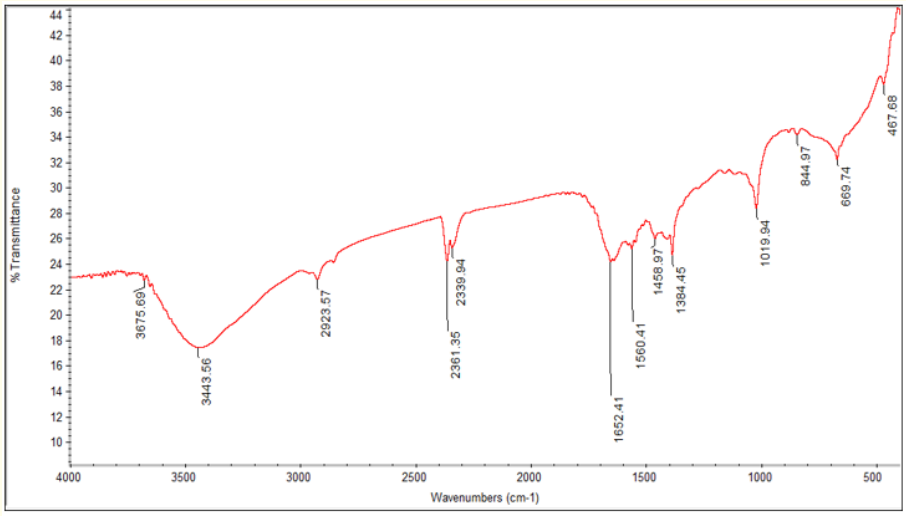

Figure 17: *FTIR spectrum of the sample of Lambis lambis.*

S.No	Peak value Cm^{-1}	Stretching	Interpretation
1.	3443.56	N-H symmetric	Amines
2.	2923.57	=C-H stretch	Alkenes
3.	2361.35	O-H stretch	Carboxylic Acids
4.	1652.41	C=O stretch	Acyl Chlorides
5.	1384.45	Ring C=Cstretch	Aromatic Compound
6.	1019.94	=C-O-C sym	Ethers
7.	669.74	C-H bend	Aromatic Compound
8.	467.68	C-Br stretch	Alkyl halides

Table 1: *FTIR spectrum of the sample of Lambis lambis.*

The *C. ramosus* tissue showed the characteristic absorption peaks were showed range from 3424.22 cm^{-1} to 466.93 cm^{-1} (Table 2). The functional groups are O-H stretch (Alcohols), C-H stretch (Alkens and Alkyls), C=C stretch (Alkenes) Ring C=C stretch (Aromatic compound), =C-O-C sym (Ethers), C=C stretch (Alkenes) C=Br stretch (Alkyl halides) (Figure 18).

S.No	Peaks value Cm^{-1}	stretching	Interpretation
1.	3424.22	O-H stretch	Alcohols
2.	2850.3000	C-H stretch	Alkens and Alkyls
3.	1638.33	C=C stretch	Alkenes
4.	1475.35	Ring C=C stertch	Aromatic compound
5.	1020.74	=C-O-C sym	Ethers
6.	862.20	C=C stretch	Alkenes
7.	466.93	C=Br stretch	Alkyl halides

Table 2: *FTIR spectrum of the sample of C. ramosus.*

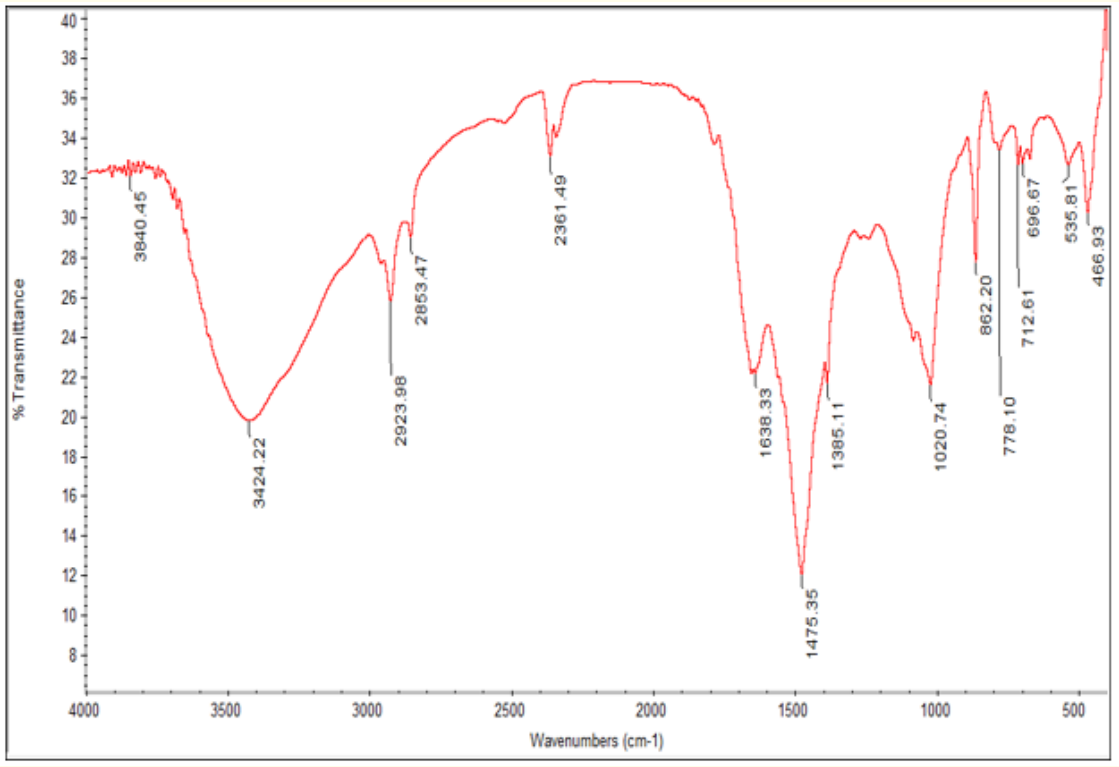

Figure 18: *FTIR spectrum of the sample of C.ramosus.*

The *B. spirata* tissue showed the characteristic absorption peaks were showed range from 3315.41 cm^{-1} to 603.68 cm^{-1} (Table 3). The functional groups are O-H stretch(Alcohols), ≡C-H stretch (Alkynes), C=O stretch (Ketones) C-H bend (Alkanes and Alkyls), $-CH(CH_3)_2$ (Alkanes and Alkyls), C-O stretch (Alcohols), C-CL stretch(Alkyl halids) (Figure 19).

S.No	Peaks value Cm^{-1}	Stretching	Interpretation
1.	3315.41	O-H stretch	Alcohols
2.	3197.76	≡C-H stretch	Alkynes
3.	1670.24	C=O stretch	Ketones
4.	1400.22	C-H bend	Alkanes and Alkyls
5.	1193.85	$-CH(CH_3)_2$	Alkanes and Alkyls
6.	1116.71	C-O stretch	Alcohols
7.	603.68	C-CL stretch	Alkyl halids

Table 3: *FTIR spectrum of the sample of B.spirata.*

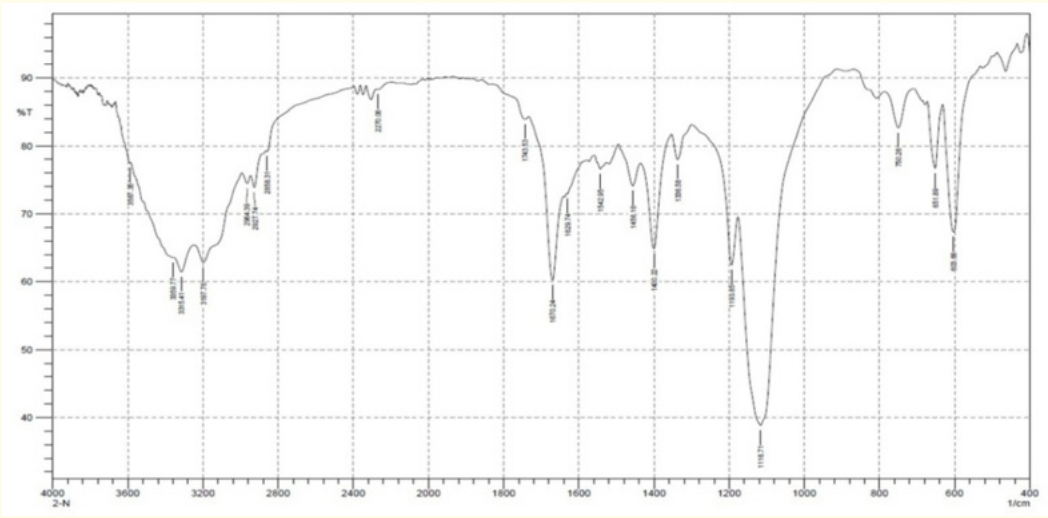

Figure 19: *FTIR spectrum of the sample of B.spirata.*

The *X. pyrum* tissue showed the characteristic absorption peaks were showed range from 3423.75 cm^{-1} to 699.97 cm^{-1} (Table 4). The functional groups are N-H symmetric (Amines), C-H stretch (Alkenes and Alkyls), C=O stretch (Ketones), C-H bend (Alkenes and Alkyls), =C-O-C sym (Ethers), =C-H bend (Alkenes) (Figure 20).

S. No	Peaks value Cm^{-1}	Stretching	Interpretation
1.	3423.75	N-H symmetric	Amines
2.	2925.13	C-H stretch	Alkenes and Alkyls
3.	1652.86	C=O stretch	Ketones
4.	1385.04	C-H bend	Alkenes and Alkyls
5.	1020.65	=C-O-C sym	Ethers
6.	699.97	=C-H bend	Alkenes

Table 4: *FTIR spectrum of the sample of X. pyrum.*

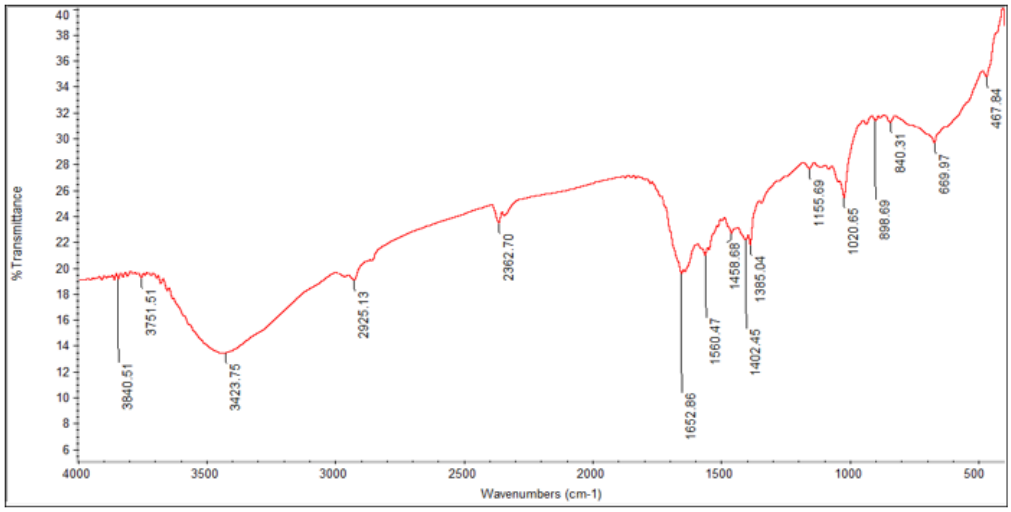

Figure 20: *FTIR spectrum of the sample of X. pyrum.*

Discussion and Conclusion

The molluscs have been recognized as a high quality nutritious food source and many species are considered as culinary delicacies. A considerable amount of literature has been published on the nutritional composition of some gastropods. For example, several studies have reported relatively high protein levels found in mollusc flesh, including abalone Haliotis diversi color [15] and oysters Crassostrea gigas [16,17]. The nutritional quality of mollusc flesh lies not only with the high quality of protein, but also in its relatively low lipid content and high proportion of polyunsaturated fatty acids (PUFAs) [18,19]. In the present study the maximum proximate composition was observed in *X. pyrum* and minimum was observed in *L. lambis* based on the amount of protein content in their body tissues. According to in the like, Krishnakumari [20] reported that the increase in the amount of carbohydrate during pre-spawning can be attributed to the proliferation of sex cells and decrease in the amount of carbohydrate during post spawning may be due to release of gametes from gonad.

Nirmal [21] has observed the highest level of lipid 10.38% in *Babylonia zeylanica* and 1.97% in *Pleuroploca trapezium* respectively. The fluctuations in lipid values closely followed by Protein and carbohydrate levels. Giese [22] have suggested that a lipid value of 5% dry weight is a good estimate of structural lipid and it plays a role as reserves. The ash refers to the inorganic residue remaining after either ignition or complete oxidation of organic matter in food stuff. It is a part of proximate analysis of nutritional evaluation [23]. In the present the observation of gastropods constitutes very low amount of ash when compared to other nutritional elements, which was in agreement with earlier findings of Babu., *et al* [14].

Fish and shellfish provide an almost unlimited variety of fatty acids with beneficial role in human health. There are no risks attached to these fatty acids and generally, except for deep fried portions, they are relatively low in fat compared to farm meats. Reisbick., *et al.* [24] reported that palmitic acid, stearic acid, oleic acid, linolenic acid, arachidonic acid, docosatetraenoic acid, docosapentaenoic acid, docosahexaenoic acid and eicosapentaenoic acid as major fatty acids in the gastropod, of *Trochus niloticus*. Amino acids are the basis of all life processes, as they are absolutely essential for every metabolic process. Biological value of protein is obviously reflected upon its essential amino acid's concentration. Amino acids have also been used as quality indices for various fish and mollusc species [25]. The gastropods have a balanced distribution of all essential amino acids required for an adult per day. This study clearly demonstrates

that these marine molluscs can be well used as the potential source of amino acid by all sections of people to do way with malnutrition. The present study, the amino acid profile of gastropods has maximum equally distributed. These amino acids are important as they give mollusc, their characteristic taste and flavour [25]. In general, the shellfish have a balanced distribution of all essential amino acids required by an adult per day [7].

In the present study fatty acids viz. saturated, monosaturated, and polysaturated, fatty acid estimates the slightly variation in four gastropods. Similarly Periyasamy., *et al*. [7] reported that, isoleucine was maximum among the amino acids followed by valine and lysine in *B. spirata*. In the present report also the essential amino acid, isoleucine was dominated over others in *B. spirata*. Infrared and Raman spectroscopy can be used to study the vibration and rotational energies of molecules. In the study of molecular vibration of infrared spectroscopy has contributed more to this field than Raman spectroscopy due to the rapid developments in infrared instrumentation. Infrared spectral analysis of biological materials was utilized to investigate their chemical constituents. These are recognized even when the availability of material is less.

The FTIR spectrum of the *L. lambis* sample recorded the number of peaks lying between 3443.56cm^{-1} to 467.68cm^{-1} and it showed 8 major peaks. The previous research showed that the *B. spirata* (thazhagunda southeast coast of India) also recorded the number of peaks lying between 465.75cm^{-1} to 3388.75 cm^{-1} [7]. In the results of FTIR analysis reveals the presence of bioactive compound signals at different range of four gastropod. Likewise, Nakamoto [26] studied the IR spectra of the marine mollusc shells, exhibit the peaks at 700, 714, 856, 1086 cm^{-1} suggesting that the $CaCo_3$ present in the shell is in the form of aragonite and also the peaks at 1790, 2520, 2920 and 3400 cm^{-1} reveal the functional groups such as Co_3, CH_3, C-H, N-H of organic compounds of the shell matrix. The FT-IR spectrum of polysaccharides showing antioxidant activity in *Sepia aculeata* showed characteristic peaks in the range of 3840.27 to 462.92 cm^{-1}. A broad peak at 3444.87 cm^{-1} is reported to be indicative of the hydroxyl stretching vibration and the sharp peak at 2929.87 cm^{-1} represents the characteristic -CH- stretching vibrations [27,28]. The biochemical analysis of selected gastropods discovered the presence of the high quality protein with all the essential amino acids for the maintenance and growth of the human body. Further they were rich in 'good fat' called Omega-3 fatty acid, essential for the normal retina development, regulation of nerve transmission, blood pressure, blood clotting, body temperature, inflammation, immune and allergic responses. In generally, the seafood is one of the most nutritionally balanced foods. Studies on nutritional composition of molluscs in India are very limited. This might be due to lack of awareness on benefits of the nutrients particularly from shellfish tissue. The nutritional values of gastropods are not brought to the limelight so far, so consumption of the nutrient rich gastropods has not attracted attention. The conclusion of the present study, it was clear that the body tissue of molluscs especially gastropods has rich nutritive value, can be used for alternate source as a regular sea food which supplies nutrients for the growing children, pregnant women and people suffering from malnutrition.

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