

BIOCHEMICAL COMPOSITION OF MARINE PRAWN *PENAEUS MONODON* SHELL WASTE

S. Gomathy¹, S.Sankaravadivu², M.Marieswari³

¹ Assistant Professor, PG and Research Department of Zoology, V.O. Chidambaram College, Thoothukudi - 628008, Tamilnadu, India.

² Assistant Professor, Department of Chemistry, A.P.C. Mahalaxmi College for Women, Thoothukudi - 628008, Tamilnadu, India.

³ M.Sc Zoology, PG and Research Department of Zoology, V.O. Chidambaram College Thoothukudi - 628008, Tamilnadu, India.

ABSTRACT

Penaeus monodon is one of the most commercially exploited shrimp species which generates a large amount of shrimp bio-waste. In the present study preliminary chemical screening of petroleum ether, benzene, methylene chloride, chloroform, ethanol, methanol and water extracts of marine prawn *Penaeus monodon* shell waste were performed. Quantitative estimation, UV and IR analysis were done using the crude sample. Carbohydrate, proteins, lipids, aromatic acids, phenols, flavonoids, alkaloids, terpenoids, steroids, coumarins, tannins, saponins, quinones, anthraquinones, and catechins were observed in this species. The interpretation of the spectrum showed the presence of Alcohols, phenols, Alkenes, Aromatics, Nitro compound, Aliphatic amines, Primary and secondary amines. Carbohydrates, proteins, lipids, phenols and flavonoids were observed in the sample. UV and IR Spectral analysis predict organic and inorganic matter present in the sample. Observations suggest that this commonly available *Penaeus monodon* species has active biochemical potential possessing antioxidant, anti-inflammatory and antimicrobial properties for curing various ailments which can lead to the isolation of new and novel compounds.

Keywords

Penaeus monodon, biochemical screening and shell waste.

INTRODUCTION

Shrimp aquaculture in India has grown to a greater extent in the last few years due to excessive global demand. Shrimp industry in India generates a large volume of waste material. In India, 1,25,000-1,50,000 tonnes of shrimp wastes are discarded per year by the shrimp processing industry alone (Sachindra *et al.*, 2006). The conversion of these waste materials into value added forms like chitin, chitosan etc. will not only be of economic value but also environmental friendly. The carapace, tail and leg portions of crustacean are not being consumed and are removed during food processing which accounts up to approximately 50% of the harvested amount (Wang *et al.*, 2007). Thoothukudi coast is famous for the availability of economically important such species. Therefore biochemical screening, quantitative estimation, UV and IR spectral studies of marine prawn *Penaeus monodon* shell collected from the Thoothukudi was investigated in this study.

MATERIALS AND METHODS

Collection of animals

Penaeus monodon shell waste was collected from Thoothukudi threspuram market.

Preliminary Chemical Screening

Standard procedures as suggested by Harborne, 1973 were followed.

Biochemical Estimation

Total carbohydrates were estimated by Anthrone method, protein by peptone method, lipid by bragdon method, phenol by folin-ciocalteu reagent and flavonoid by aluminium chloride mehod using spectrophotometric anyalsis (Roe, Lowry, bragdon, chang and meervat)

UV and IR spectral studies

UV and IR spectral studies were done by the ethanolic extarct of sample using standard procedures.

RESULTS AND DISCUSSION

100 g of the powdered animal material was extracted successively with solvents like the Petroleum Ether (40-60°C), Benzene, Methylene Chloride, Chloroform, Ethanol, Methanol and water using Soxhlet apparatus. The extract was cooled to room temperature. It was then evaporated in a vacuum evaporator under reduced pressure to get a greenish brown sticky residue. Preliminary biochemical screening for the presence of carbohydrate, proteins, lipids, aromatic acids, phenols, flavonoids, alkaloids, terpenoids, steroids, coumarins, tannins, saponins, quinones, anthraquinones, and catechins were tested qualitatively using the extracts of Petroleum Ether (40-60°C), Benzene, Methylene Chloride, Chloroform, Ethanol, Methanol and water.

The results are presented in Table 1. Carbohydrate, proteins, aromatic acids, coumarins and tannins have been detected in Petroleum Ether (40-60°C) extract whereas lipids, phenols, flavonoids, alkaloids, terpenoids, steroids, saponins, quinones, anthraquinones and catechins were not observed. Carbohydrate, proteins, aromatic acids, phenols, flavonoids, alkaloids, terpenoids, steroids, coumarins and saponins have been observed in Benzene extract whereas lipids, tannins, quinones, anthraquinones and catechins were not noted. Carbohydrate, proteins, lipids, aromatic acids, phenols, flavonoids, alkaloids, terpenoids, steroids, coumarins and saponins have been identified in Methylene chloride extract whereas tannins, quinones, anthraquinones and catechins were not detected. Carbohydrate, proteins, lipids, aromatic acids, phenols, flavonoids, alkaloids, terpenoids, steroids, and saponins have been noted in Chloroform extract whereas coumarins, tannins, quinones, anthraquinones and catechins were not identified.

Carbohydrate, proteins, lipids, aromatic acids, phenols, flavonoids, alkaloids, saponins and anthraquinones have been detected in Ethanol extract whereas terpenoids, steroids, coumarins, tannins, quinones, and catechins were not presented. Carbohydrate, proteins, lipids, aromatic acids, phenols, flavonoids, alkaloids, saponins, quines and catechins have been detected in Methanol extract whereas terpenoids, steroids, coumarins, tannins and anthraquinones were absent. Carbohydrate, proteins, aromatic acids and tannins were observed in Water extract whereas lipids, phenols, flavonoids, alkaloids, terpenoids, steroids, coumarins, saponins, quines, anthraquinones and catechins were not found. Marine prawn provide a rich source of bioactive compounds such as proteins and peptides. The bioactive proteins and peptides derived from marine prawn have gained enormous interest in nutraceutical, pharmaceutical, and cosmeceutical industries due to their broad spectrum of bioactivities, including antioxidant, antimicrobial, and anti-aging activities. Phenolic compounds, saponins and flavonoids may be linked or suggested to be involved with antibacterial, antiviral and antidiarrhoeal activity as reported.

Table 1: Preliminary biochemical screening of marine prawn *Penaeus monodon* shell waste

S. No.	Test	Petroleum Ether (40-60 °C)	Benzene	Methylene Chloride	Chloroform	Ethanol	Methanol	Water
1.	Carbohydrates	+	+	+	+	+	+	+
2.	Proteins	+	+	+	+	+	+	+
3.	Lipids	-	-	+	+	+	+	-
4.	Aromatic acids	+	+	+	+	+	+	+
5.	Phenols	-	+	+	+	+	+	-
6.	Flavonoids	-	+	+	+	+	+	-
7.	Alkaloids	-	+	+	+	+	+	-
8.	Terpenoids	-	+	+	+	-	-	-
9.	Steroids	-	+	+	+	-	-	-
10.	Coumarins	+	+	+	-	-	-	-
11.	Tannins	+	-	-	-	-	-	+
12.	Saponins	-	+	+	+	+	+	-
13.	Quinones	-	-	-	-	-	+	-
14.	Anthraquinones	-	-	-	-	+	-	-
15.	Catechins	-	-	-	-	-	+	-

+ Present, - Absent.

Table 2: Quantitative estimation of marine prawn *Penaeus monodon* shell waste

S.No	Chemical constituents	Percentage
1.	Carbohydrates	13.25
2.	Proteins	15.26
3.	Lipids	4.02
4.	Phenol	10.63
5.	Flavonoid	12.53

Quantitative estimation of marine prawn *Penaeus monodon* shell waste were done by spectrophotometric analysis. Total carbohydrate were observed in 3.25%; protein 15.26%; lipids 4.02; phenol 10.63% and flavonoids 2.53% respectively.

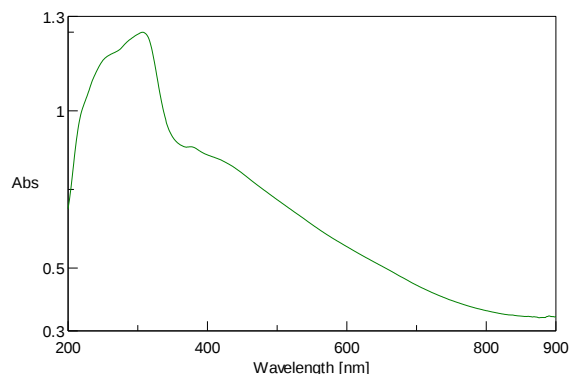


Fig.1 UV analysis of marine Prawn *Penaeus monodon* shell waste

UV analysis of marine Prawn *Penaeus monodon* shell waste predict the result shown the presence of some inorganic matter present in the sample shown at the wavelength of 200-400 nm.

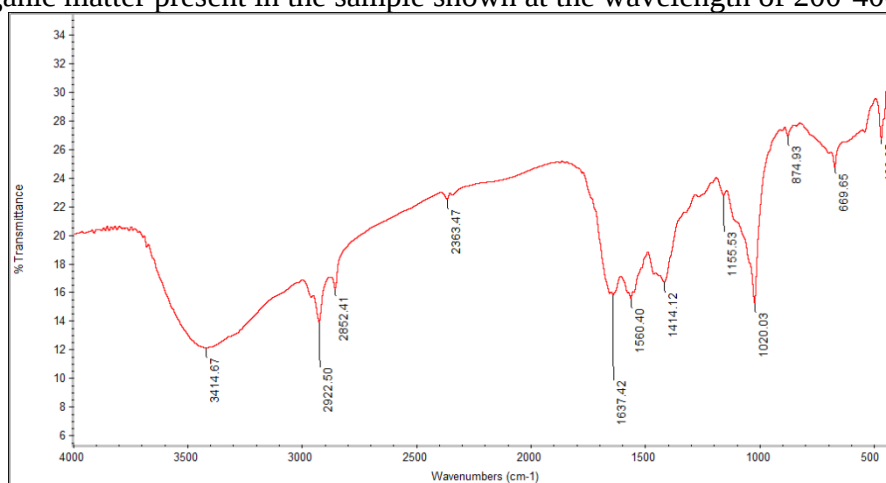


Fig. 2 FT – IR analysis of marine prawn *Penaeus monodon* shell waste

FT – IR analysis of marine prawn *Penaeus monodon* shell waste predict the result of various peaks of different wavelengths. It reported the frequency of 3424.67 cm⁻¹ in the presence of phenolic group and aromatic behaviour, 2922.50 cm⁻¹ in the presence of alkenes and 1560.40 cm⁻¹ presence of nitro compounds as well as below 600 cm⁻¹ represents the presence of inorganic matters in the crude sample.

CONCLUSION

This result reported and concluded that the chemical constituents present in the sample of Marine prawn *Penaeus monodon* shell waste. It helps to standardise and synthesise a new drug from the sample in future studies.

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