E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2019; 7(5): 410-413

www.fisheriesjournal.com
Received: 25-07-2019
Accepted: 28-08-2019

Vardi Venkateswarlu
Department of Marine Biology, Vikrama Simhapuri University, Nellore, Andhra Pradesh, India

Correspondence
Vardi Venkateswarlu
Department of Marine Biology, Vikrama Simhapuri University, Nellore, Andhra Pradesh, India

Comparative analysis of the Biochemical Composition of wild caught *Penaeid shrimps* (*Penaeus indicus*, *Penaeus monodon* and *Penaeus vannamei)* in Nellore, Andhra Pradesh

Vardi Venkateswarlu

Abstract
The purpose of present study was conducted to compare the biochemical composition of wild caught shrimp *Penaeus. indicus, Penaeus. monodon* and *Penaeus. vannamei*. The moisture, protein, lipid, carbohydrate and ash were analyzed. The mean value of moisture, protein, lipid, carbohydrate and ash were found as 78.9, 52.4, 11.3, 13, 5.7% respectively in *P. indicus* and 80.8, 48.6, 10.9, 7.4, 6.1% respectively in *P. monodon*. In wild and cultured shrimp the mean value of moisture, protein, lipid, ash and carbohydrate were found 76.3, 39.8, 16.1, 4.8, and 4.9% respectively in *P. vannamei*. The biochemical proximate compositions were significantly ($p \leq 0.05$) in all three shrimp samples. It showed the wild caught shrimp contain superior nutrients. Meanwhile, the wild shrimp showed better nutrient value. Hence, present study suggests that locally available shrimp can be used as a healthy choice of sea food for human consumptions and good source of animal protein.

Keywords: Biochemical composition, Nellore coast, *Penaeid*, shrimps

1. Introduction
Shrimp is an important source of animal protein which is available as inexpensive and is easily digestible proteins. Shrimp is a major source of essential fatty acids and also contains proteins, carbohydrates, lipids, vitamins, and trace elements. Shrimp is extensively consumed worldwide by human as it provides polyunsaturated fatty acids especially ω-3 fatty acids known to support good health. Major components of ω-3 fatty acids such as EPA and DHA are highly concentrated in the brain and required for the early development stage, and for visual sharpness [1] and also a major component of cell membranes and precursors of the eicosanoids hormones [2]. Beneficial health effects of n-3 PUFA are well stated and include the prevention of a number of diseases, such as coronary heart diseases, hypotriglyceridemic effect, inflammation, allergies, arthritis, hypertension, autoimmune disorders, and cancer [3. Studies with new-borns indicate that DHA is vital for the normal functional development of the retina and brain [4].
People have been enjoying shrimp as a portion of food since times immemorial. Shrimp is found throughout almost the entire world. While many countries farm raises shrimp, much of the world's supply comes from India. The overall quality of the shrimp is determined by its freshness and this is effected by the biochemical composition namely, the relative concentrations of essential compounds such as proteins, lipids, and carbohydrates.
Shrimp is a rich source of vitamin D, vitamin B12, PUFA, iron, phosphorous, niacin, zinc, copper and magnesium. In addition to this, it is also a good source of cardioprotective omega 3 fatty acids noted for their anti-inflammatory effects and ability to prevent the formation of blood clots. Shrimp provides 64.2% of the daily value for selenium in a 4-ounce serving. At present three candidate species are being reared under coastal aquaculture activity in A.P. *viz* shrimp of these earlier *P. indicus*, *P. monodon* and now *P. vannamei* dominates shrimp farming. There was also a lot of improvement in the socio-economic conditions of rural masses due to successful shrimp farming. Keeping all this in view, it is thought worthwhile to study the nutritive value of these selective shrimp species [5, 6].
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Due to their nutritious nature, apart from the supply of good quality Proteins, Lipids, they also contain several dietary minerals such as Calcium, Iron etc., which are beneficial and essential and play an important role in maintenance of Physiological and Biochemical activities in human beings. Therefore prawns and shrimps are considered to be most popular species as it is a part of almost every nation's traditional meal rich in protein and minerals. Penaeid shrimps constitute a major capture fisheries component in the Aquaculture practices. Among the penaeid prawns *Penaeus monodon, Penaeus indicus, Penaeus semisulcatus, Litopenaeus vannamei, Metapenaeus monoceros, M. dobsoni* are considered to be important major commercial prawn species available in India. Among the above prawn species, several are considered to be most prominent promising candidate species for culture activity in India. Till date the primary focus of prawn nutrition research has been evaluate diet quality in terms of growth parameters of the cultured prawn species, but knowledge of the biochemical composition of edible organisms, which is extremely important since the nutritive value is reflected in biochemical contents, was not attempted for tropical penaeid prawns of Andhra Pradesh. Therefore, the present study is aimed to probe into the aspects for the evaluation of proximate composition of basic biochemical constituents including proteins, lipids, carbohydrates, amino acid profiles, fatty acid profiles etc., to assess the nutritional significance of penaeid prawns.

Main objective of the present study was to investigate the nutritional profile of the three commercially important edible shrimp sps, namely *P. indicus, Penaeus monodon, P. vannamei* collected from Krishnapatnam coast of Nellore, which is easily accessible and available in local fish markets to common people, thereby stimulate the need for utilization of seafood and provide information regarding the nutritional benefits of the above mentioned edible shrimp sps. Regular consumption of this seafood could reduce nutritional deficiency to a great extent.

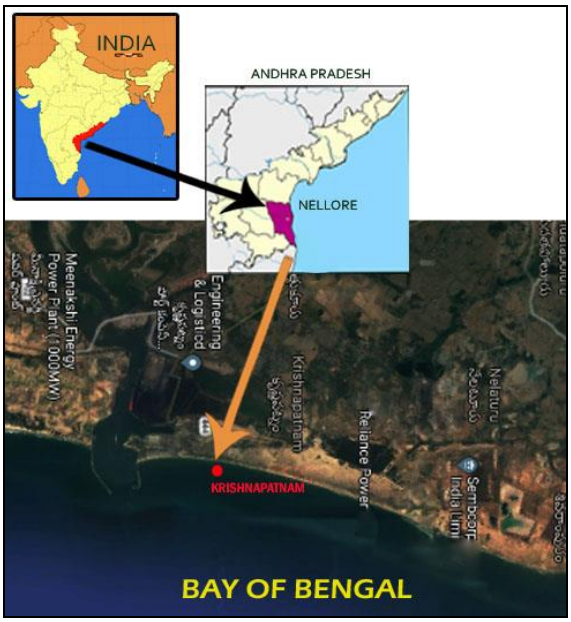

Fig 1: Map showing sampling area of Shrimp at Krishnapatnam coast, Nellore.

1.1 Study Area

The Nellore district has a 169 km of the coastal line with habitation of fishermen community along the east coast of India. The Nellore coastal region is suitable for the brackish water aquaculture particularly *L. vannamei* farming, and this district named as 'Shrimp capital of India' due to large-scale farming and production of brackish water shrimp. The present sampling site of Krishnapatnam coastal area is an important marine fishing spot in the Nellore coastal region (Fig. 1).

2. Materials and Methods

2.1 Sample preparation for biochemical analysis

Shrimp were collected from Krishnapatnam coast, Nellore, and brought to the laboratory by store in the ice box. Shrimp muscle was separated from samples like *P. indicus, Penaeus monodon, P. vannamei* as a whole were homogenized to prepare mince. Homogenized muscle tissue was used for various biochemical analyses.

2.2 Biochemical Analysis

The biochemical analysis in the shrimp samples was analyzed by following the AOAC 2000 [7] standard methods. The percentage of moisture content was estimated by using hot air oven temperature at 105°C of drying 10 grams of homogenized sample, overnight until a constant weight obtained by moisture loss. After ascertaining the species, the biochemical composition was estimated. Proximate analysis of muscle samples was used. It must be mentioned here that water content, percentage of protein, fat and ash content are represented of dry weight obtained by calculating the average percentage composition from the samples. The average content of each chemical constituent was calculated from all the samples of each sample of the each species.

For determination of protein the Kjeldahl method [8] was followed by taking 100 mg of samples were digested in concentrated sulfuric acid along with digestion mixture until the solution become colorless. The total nitrogen content was measured and conversion factor 6.25 was used to calculate crude protein composition. Crude fat content of tissue samples were estimated with soxhelet fat analyzing equipment using petroleum ether as extraction solvent (boiling point 40-60°C) by taking 1 g of dried sample for analysis. Ash content was estimated by using muffle furnace by heating the sample at 600°C for 6-8 h until sample become ash followed by AOAC method.

3. Results and Discussion

Studies on the biochemical composition of penaeid shrimp samples, i.e. moisture, protein, fat, carbohydrate and ash contents collected from coastal waters of the Nellore are presented in Table 1 and graphically represented in Fig.2.

Table 1: Biochemical compositions of Penaeid Sps. (Mean ±SD) percentage of dry weight basis.

Name of the Penaeid sps.	Moisture	Protein (%)	Fat (%)	Carbohydrates (%)	Ash (%)
P. indicus	78.9	52.4	11.3	13	5.7
P. monodon	80.8	48.6	10.9	7.4	6.1
P. vannamei	76.3	39.8	16.1	4.8	4.9

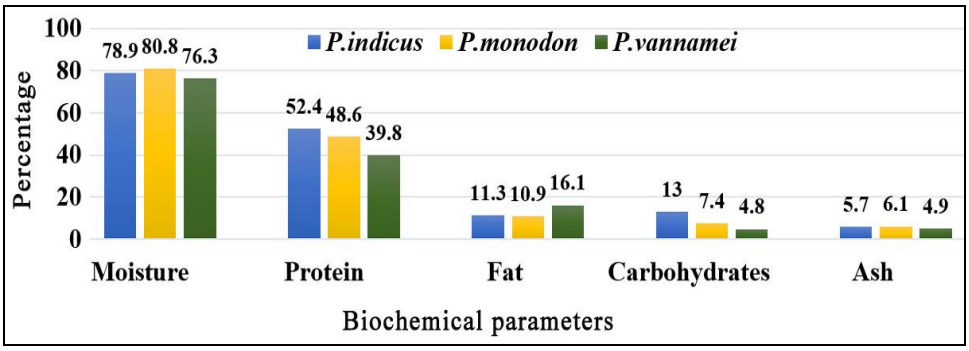

Fig 2: Biochemical compositions of *penaeid* sps. (Mean ±SD) percentage of dry weight basis

The percentage moisture content in the peeled tails of shrimp samples collected from coastal waters of Nellore varied from 76.3% to 80.8% with an average of 78.6 %, protein content ranged between 39.8% and 52.4% with an average of 46.9%. The fat content varied from 1.9% to16.1% with an average of 12.7%, carbohydrate content ranged between 4.8% and 13% with an average of 8.4% and ash content varied between 4.9% and 6.1% with an average of 5.5 % [9].

The biochemical composition, Moisture, protein, Fat, carbohydrate and Ash contents of penaid shrimp samples collected from coastal waters were estimated and compared. From the results we infer that the percentage moisture content of the wild caught shrimp samples exhibited relatively minimal variations among selected shrimp samples.

In general, the moisture content, protein and ash contents in the muscle of shrimp collected from the coastal habitats is more or less or nearly same, in the present study protein content was observed more in 52.4% in *P.indicus* and 48.6% in *P.monodon* and 39.8% in *P.vannamei* respectively protein useful to build and repair tissues, to make enzymes, hormones, and other body chemicals. Protein is an important building block of bones, muscles, cartilage, skin, and blood.

Fat content was observed more 16.1% in *P.vannamei*, 11.3% in *P.indicus* and 10.9% in *P.monodon* and respectively. The body uses fat as a fuel source, is the major storage form of energy in the body. Fat also has many other important functions in the body, and a moderate amount is needed in the diet for good health the fat from sea food source is good for the health [10].

Carbohydrate content was observed more 13% in *P. indicus*, 7.4% in *P. monodon* and least 4.8% observed in *P. vannamei* respectively. Carbohydrates provide fuel for the central nervous system and energy for working muscles. They also prevent protein from being used as an energy source and enable fat metabolism, also carbohydrates are important for brain function.

Ash content was observed more 5.7% in *P. indicus*, 6.1 % in *P. monodon* and least 4.9% observed in *P. vannamei* respectively.

Biochemical analysis of shrimp proximate composition and their nutritional parameters in the tissues which showed their nutritional quality specifically protein, fat, carbohydrates and ash. The species selected for determining the biochemical composition of the three commercially important edible shrimp species reveals an initiative that *P. indicus* is rich in protein and carbohydrate, *P. vannmei* rich in fat compared with remaining shrimp samples and their overall nutritional efficiency.

4. Conclusion

Biochemical analysis of shrimp proximate composition, the percentage of moisture, protein and ash contents in the muscle of wild-caught shrimp collected from coastal waters of the Nellore, are more or less same. The carbohydrate and ash component in specimens exhibited low values. The coastal water shrimp samples were registered very high values of protein as showed relatively high-fat concentrations. shrimps are good sources of proteins, energy and average mineral supply based on the ash content and shell of these shrimps can serve as an alternate fount of high-quality animal protein for human consumption and for the formulation of animal feed, shrimp feed, shrimp industry, nutritionists, pharmaceuticals, chemists, etc. Future analysis on the alcohols, alkyl halides, carboxylic acids, aromatics and alkynes and carotenoid, essential amino acids to be quantified in the future study. Also, further seasonal analysis of the three species implies future research shreds of evidence in the field of nutrition and health.

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