Short Communication

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Chemical Constituents and Amino Acid Pattern of Shrimp *(Penaeus merguiensis)* from Karachi Coastal Waters

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The chemical composition and amino acid pattern of shrimp have been extensively investigated in various parts of the world [1-5]. However, only a fragmentary data are available on chemical composition and amino acid profile of shrimp [6-8] from Pakistan. The present investigation reports the morphometric analysis of shrimp and proximate composition, protein and free amino acid of commercially important shrimp species *(Penaeus merguiensis)* found around Karachi Coastal area.

Shrimp (*P. merguiensis*) were obtained from commercial sources, brought to the laboratory and frozen immediately at –30°.

For chemical analysis, 40 shrimp were selected. Protein (N x 6.25), non protein nitrogen (TCA extract), ash and moisture were determined according to AOAC procedures [9]. Fat was extracted by the Bligh and Dyer's method [10]. Amino nitrogen was determined by the prodcedure of Cobb *et al.* [11].

Protein amino acids in the shrimp meat were determined after free amino acid extraction. A known amount of tissue sediment containing not more than 10 mg nitrogen was taken and refluxed with 5.7 M hydrochloric acid containing 0.1% phenol for 24 hrs at 110°. Hydrolysed sample was neutralized with 7.5 M sodium hydroxide (Amino Acid Analysis theory and Laboratory Technique Hand Book, 1986). Free and protein amino acids were measured by the use of a LKB Biochrom Model 4151 Alpha Plus fully automated Amino Acid Analyzer.

The average proximate composition (g/100g) of shrimp meat (moisture 77.1, fat 1.3, protein (N x 6.25) 20.9, non-protein nitrogen 0.665, amino acid nitrogen 0.340, protein nitrogen 2.685 and ash 1.4) shows that these values are similar to those reported for tropical and cold waters shrimp (1-3,6,7). Sidwell *et. al.* [4] compiled comprehensive data on moisture, protein, lipid and ash contents for cold and tropical water shrimp. The variability in fat and moisture content was attributed to the season, size, age, sex, place and type of shrimp (which influence the fat and moisture) but not protein and ash content. The distribution of nitrogen in shrimp meat (g/100g) was found to be as follows; total nitrogen, 3.35; nonprotein nitrogen (NPN) 0.665, protein nitrogen 2.685, amino nitrogen (AN) 0.340. Non-protein nitrogen was found to be 19.85% of total nitrogen in shrimp meat. NPN in crustanceans has been reported to vary between 18 - 20% of total nitrogen [8].

Table 1 shows the composition of protein and free amino acids of shrimp muscle (*Penaeus merguiensis*). According to this investigation the pattern of amino acids distribution in shirmp protein is relatively uniform, slight differences were observed compared to those reported by other workers [3,6]. Glutamic acid, aspartic acid, arginine, glycine, leucine, histadine and alanine seem to be the major amino acids comprising about 71.32% of the total protein amino acids. Glutamic acid and aspartic acid being the most abundant amounting to 29.13% of the total. All other except tryptophane, cystine and cysteine in the traces were relatively small in concentration.

In general, the composition of protein amino acids was found similar to those reported by other workers [3,6]. Shrimp

TABLE 1. COMPOSITION OF PROTEIN AND FREE AMINO ACIDS OF SHRIMP (*P. MERGUENSIS*).

S.No.	Amino acid	Amino acids	
		Protein g/100 g	Fresh muscle mg/100 g
1.	Arginine	10.08	176.0
2.	Glycine	05.05	290.0
3.	Histadine	05.00	1.49
4.	Threonine	03.21	43.98
5.	Methionine	02.36	41.8
6.	Serine	04.95	70.5
7.	Valine	04.56	112.42
8.	Lysine	08.12	117.02
9.	Leucine	08.15	33.42
10.	Isoleucine	02.00	134.92
11.	Alanine	06.00	120.0
12.	Tyrosine	03.36	7.5
13.	Phenylalanine	03.48	9.4
14.	Cystine	Traces	Traces
15.	Cysteine	–	–
16.	Proline	2.96	115.0
17.	Tryptophane	Traces	Traces
18.	Aspartic acid	11.60	120.5
19.	Glutamic acid	17.53	20.02
20.	Glutamine	–	–
21.	Taurine	–	150.0

protein was found to contain higher levels of arginine, histidine, aspartic and glutamic acid and relatively low level of leucine and isoleucine compared to fish. Similar profile has been reported for shrimp and other crustaceans by many workers [3,6,12].

The principal free amino acids in shrimp (*P.merguiensis*) muscle were glycine, arginine, lysine, alanine, isoleucine, aspartic acid, proline and valine accounts for 75.82% of the total free amino acids (Table 1). Arginine and glycine have been reported to be the most abundant amino acids found in shrimp, prawn and other crustaceans [3,5).

Infact, arginine was the second dominant free amino acid present in the shrimp extract. No arginine has been reported by Khan [8]. Our values, in general are similar to the values reported earlier (3,5,8).

The value of glycine (18.3%) obtained in this study is significantly low compared to the reported value (67%) by Cobb *et al.* [5] but compared well with those of other workers [3,8]. Low glycine value has been attributed to suspected low salinity and high in areas of high salinity [5]. The higher amount of free glycine has been reported to corresponds reasonably well with the platability of the shrimp and may also be involved in physiological role possibily in osmotic regulation.

Key words: *Penaeus merguiensis*, Amino acids, Chemical constituents.

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