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Review Article

Proximate Composition in Crab *Chiromantes boulengeri* from Shatt

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Abstract

The proximate chemical composition determined in muscle in male and female of crab Chiromantes boulengeri, Calman 1920 during four seasons was found to be varied among the two different size groups examined. The carapace length and weight of the crabs varied from 10.81mm to 55.16mm and 6.63g to 24.47g respectively. In general, the protein content was higher in small size groups than in large size groups. The protein content in two sexes and size groups of this species was high. Protein values ranged from 24.39-18.62%, fat values ranged from 2.67-1.92%, ash values ranged from 5.76-4.13%, moisture values ranged from 70.46-76.21%, carbohydrate values ranged from 1.53-2.47%. Protein, fat, ash, moisture and carbohydrate were significantly different ($P<0.05$) between winter and summer seasons in this specie. It also indicates that the proximate composition of this crab depends on the season but also in reaction to size, age, sex, reproducing cycle, breeding season and region of catch.

Keywords: Chiromontes boulengeri; Proximate chemical; Protein; Fats; Carbohydrates

Introduction

The Sesarmidaeae crab C. boulengeri inhabits burrows, avoiding external temperature variations, according to [1], which must be the most critical adaptation to land. Burrows offer protection against predators and attenuate external climate conditions. Furthermore, they are water and high humidity source, protecting crabs during hottest hours [2,3] are exclusively freshwater crabs they inhabit the upstream areas of a south part in the river, although it remains unclear how far from the sea. Protein deficiency may be minimized for some extent by making available cheaper fish meal items which are available to local communities. Crabs are an essential fishery product. Crabs are broadly dispersed in the tropical and calm areas of the world. Furthermore, they rank highly together with lobsters and shrimps for the fishery value they support and for their esteemed seafood delicacy [4]. This only do crab species all over the world provide a direct food source, but they are also used as fertilizers and as food additives [5]. Its taste makes it a delicacy everywhere it is found across the world. It contains minerals like calcium, copper, zinc, phosphorus, and iron in abundance with less amounts of chromium and selenium [6]. There is a lot of research on heavy metal studies and proximate composition (moisture, ash, lipid, crude protein, and carbohydrate contents) of fish. However, there is a neglect of other edible aquatic products. The nutraceutical benefits of seafood have encouraged its continuous consumption. It may therefore be imperative to determine the concentrations of heavy metals in this seafoods as well as provide information on their nutritional composition to help make an informed decision when marine products are to be consumed.

Materials and Methods

Sample collection

The Sesarmidaeae crab C. boulengeri was collected from (the intertidal zone located in the bank of Shatt Al-Arab near Italy bridge, Shatt Al-Arab city). The study was conducted from July 2016 to June 2017. Totally 325 specimens (size ranging from 10,81 to 55,16mm in length and 6.63g to 24.47g weight, respectively) were collected by hands in burrows and transported to the laboratory in live condition and washed with distilled water to remove dust and algal particles and eventually ice killed. Then they were separated in to two groups viz. male and female. Further grades were made according to the two-size group and placed into smaller and adult groups. The grounded samples were then freezing dried and powdered and stored in the refrigerator for further analysis.

Chemical analysis

The percentage of proximate composition of prawn samples were determined by the conventional method of AOAC (2000) [7]. Triplicate determinations were carried out on each chemical analysis.

Estimation of moisture: The initial weight of the sample was taken they were dried in an

oven at about 105 °C for about 8 to 10h until constant weight was reached, and the samples were minced in an electric grinder. The percentage of moisture content was determined.

Protein determination: The protein content of the prawn samples was determined by

micro Kjeldahl method (AOAC, 2000) and by protein multiplying the value of N×6.25. It involves the conversion of organic nitrogen to ammonium sulphate by digestion of flesh with concentrated sulphuric acid in a micro kjeldahl flask. The digest was diluted, making alkaline with sodium hydroxide and distilled. The liberated ammonia was collected in a boric acid solution and total nitrogen was determined titrimetrically. Finally, percentage of protein in the sample was calculated.

Estimation of fat: For the estimation of fat content, dried samples are left after moisture

determinations were finely ground and the fat was extracted with chloroform and methanol mixture (AOAC, 2000). After extraction, the solvent was evaporated, and the extracted materials were weighed. The percentage of the fat content was calculated.

Estimation of ash: The ash content of a sample is residue left after ashing in a muffle

furnace at about 550-600 °C till the residue become white. The percentage of ash was calculated by subtracting the ash weight from initial weight. The carbohydrate content of the samples was determined as the difference from the total percentage (100%).

Statistical analysis

The statistical inxterpretation of the tabulated data was performed by using SPSS (18.0 version) for the mean standard deviation at 5% level of significance.

Results

Proximate composition

Variation seasonal in the proximate compositions of male and female of Sesarmidae crab C. boulengeri harvested in Shatt Al-Arab River is presented in Table 1. The mean total carapace length/ weight results of the male and female samples were as follows: 41.73±1.86cm/10.27±1.73g (male), 35.53±1.26cm/8.82±1.19g (female). No significant difference was found in the moisture and protein contents in hot seasons (Summer and Autumn) or cold seasons (Winter and Spring) of the study. However, both the moisture and protein values were lower in cold seasons (Table 1). No significant difference between the male and female samples in protein content was predicted, and the moisture and carbohydrate contents were similar in the two sexes, and no significant difference was observed ($P>0.05$). On the other hand, fat and moisture content was significantly higher in higher size group samples compared to smaller samples ($P<0.05$). but, the carbohydrate and ash values appeared to be no significant difference was observed between two size groups samples ($P>0.05$) and the ash values were no significant differences between male and female of Sesarmidae crab C. boulengeri (Table 2). The results of one-way analysis of variance showed that protein, carbohydrate, lipid, ash and moisture did not vary significantly between two sexes (Table 2). However, protein, lipid and moisture varied significantly between adult and small size groups except carbohydrate and ash.

Table 1: Mean proximate composition values in specimens of sesarmid crab C. boulengeri in four seasons from in Shatt Al-Arab River.

Seasons	Moisture %	Protein %	Carbohydrate %	Fat %	Ash %
Winter	72.15	18.62	2.16	2.53	6.54
Spring	71.27	20.44	2.28	2.67	6.41
Summer	74.81	21.39	1.53	1.69	4.13
Autumn	73.46	22.51	1.89	1.92	4.12

Table 2: Mean proximate composition values of male and female of sesarmid crab C. boulengeri (%) in two size groups.

Sex	Size Group	Moisture %	Protein %	Carbohydrate %	Fat %	Ash %
Male	Small (10-30mm)	70.62	24.36	1.92	2.92	4.14
Female		71.27	22.15	2.04	2.11	4.36
Male	Adult (31-55mm)	72.91	18.53	2.37	3.27	5.74
Female		74.21	17.61	2.27	3.83	5.28

Discussion

Biochemical composition of organisms was known to vary with season, size of the animal, stages of maturity and availability of food, temperature etc. Protein is the most prominent biochemical components of crustaceans from eggs to adult is strikingly dominant in younger phases. In the present study, males were found to have more protein than females. The fall in protein content, which is very well pronounced in females suggested that the protein in the muscle may be mobilized for the gonadal development [8]. The high protein content in the lowest size groups may be attributed

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to increased protein synthesis during the active growth phase as it has been observed in the muscle tissues of blue crab Portunus pelgicus [8]. In the present study the Sesarmidae crab C. boulengeri also showed higher protein content in younger ones than in adults.

Conclusion

Lipids act as major food reserves along with protein and are to periodic fluctuations influenced by environmental variables like temperature [9]. The inverse relationship between lipids and protein was earlier reported by [10-13]. Achuthan Kutty & Parulekar [14] also did not find any consistency to suggest that maturity condition influences the lipid composition of muscle tissue. In the present study also, there is no regularity in fat values among the size groups in males and females. Carbohydrate content exhibited an inverse relationship with protein content. Similar findings were recorded by [13,15,16]. The rise in carbohydrate content was gradual among the size groups and the peak value was observed in the bigger size group which may be due to more synthesis and accumulation of carbohydrates in the higher size groups than in younger ones. Various factors like gonad development in addition to starvation, feeding, rest, exercise and other physiological states changes the carbohydrate level. Presently, this higher value encountered in larger organisms might be due to storage and senility in them. No distinguished trend in carbohydrate fluctuation was noticed among the size groups of many shrimps studied by [14,17]. In the present study, males generally showed higher carbohydrate values than females, which is agreement with [17]. However, the variations of carbohydrate between sexes and size groups are not statistically significant.

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