

Research Report

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Biochemical Composition of Three Commercially Important Fishes (*Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol*) Collected from Sonmiani, Balochistan Coast of Pakistan

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Abstract This study reports the biochemical composition of three important edible commercial fish species (1. *Liza vaigiensis* 2. *Rastrelliger kanagurta* 3. *Scomberoides tol*) collected during surveys of fish harbor Dam Sonmiani Balochistan coast in February, 2017. The results demonstrate that protein value ranging from 40-52%, lipid 4-6%, carbohydrate 13.3-22%, ash 20-37.5%, moisture 2-6% and water 70.7-73.7%. This study records length, width and weight of each species too. There was positive significant relationship found in between biochemical constituents of all studied fishes.

Keywords *Liza vaigiensis*; *Rastrelliger kanagurta*; *Scomberoides tol*; Measurement; Biochemical constituents

Introduction

Pakistan has a coast line of about 1120 km bordering Arabian Sea in the south at 23°50'N latitude that cover the Sindh and the Balochistan coast. Pakistan has considerable maritime zone, influenced by atmospheric forcing and reversing monsoons resulting in the strong seasonal variability in its oceanographic conditions (Turner and Annamalai, 2012). Pakistan Exclusive Economic Zone stretches 350 nautical miles seaward from the coast, provides 240,000 km² area of the Arabian Sea for exploitation of resources. The Makran Balochistan coast from the Hub River to the border of Iran has narrow shelf and pockets of mangroves (Snedakar, 1984). The Sindh Karachi coast extends to Sir Creek on the Indian border.

Along Balochistan coast there are number of bays, i.e. Ormara, Gawadar, Pasni, and much large bays at Sonmiani and Jiwani. The coast is characterized by rocky and sandy. Churna and Astola are the two uninhabited islands found in Balochistan coast, and two tombolos; Gawadar and Ormara, and two Lagoons; Kalamat Khor and Miani Hor. Except of some streams there is no major river discharge at this coast. In Gawadar bay, Kalamat Khor and Miani Hor some sections of mangroves are found. Its continental shelf is narrow and is about 6 km at Gawadar, while it extends to about 70 km in Sonmiani Bay.

Nazir et al., (2015) and FAO, (2014) reported that the fishing industry is the main source of income in Pakistan. Annually 10% of fishery products are exported. In 2002-2003 fish and fishery products were exported (valued US \$117 million). During the years 2001 there was little increase in fish consumption from 1.0 kg to 2.3 kg, but this average is very low as compared to world fish consumption for the same time scale i.e. 9.0-16.3 kg (FAO, 2014).

Sea food especially fish is an important source of protein, minerals and omega-3- polyunsaturated fatty acid (PUFA) for humans throughout the world (Ackman, 1989). Previous reports on the biochemical composition have been given by Munshi et al. (2005) and Nisa and Abdullah (2008; 2011) for the fishes collected from the coastal water of Pakistan. On the population dynamics recently Qamar et al. (2016) studied fishery of *Megalaspis cordyla* and *Scomberoides tol* from Pakistan.

Mullets and Mackerels fishes are commercially important found in coastal area of Pakistan. The *Rastrelliger*

kanagurta (Indian mackerel) is commonly harvested throughout shallow waters of Pakistani coastal area (Moazzum et al., 2005). In Pakistan fish consumption is low due to socio economic factors. Peoples prefer low prices large fishes as compared to costly small size fishes. The principal biochemical constituents of fish are protein, lipid, carbohydrates, ash, moisture and water. The aim of the present study was to obtain the biochemical composition of *Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol* found in the coastal water of Balochistan.

1 Materials and Methods

Total twelve individuals of three species of fishes *Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol* were collected during surveys of fish harbor Dam Sonmiani Balochistan coast in February, 2017 (Figure 1). Sonmiani is one of the Tehsils of District Lasbela, located 80 km North West of Karachi and consisting of Dam Bunder, Sonmiani Tower Bhira and Baloch Goth. The sampling was done by using net having mesh size of approximately 2 cm² with the assistance of local fishermen. The fishes were put in iced box and brought to laboratory, where species identification, body measurement and biochemical analysis on dry weight basis were carried out. First specimens were identified with the help of FAO (1985) identification guide book. Total three species of fishes have been collected belonging to Mugilidae, Scombridae and Carangidae families. The measurement (total length with tail, standard length and width) and weight (dry and wet) of each specimen were also taken with the help of measurement tape and digital balance respectively.



Figure 1 Map showing satellite view of Miani Hor (Dam)

The fish samples were dried at 70°C for 24 hours till a constant weight was achieved. The samples were then homogenized with a porcelain pestle and mortar to a powder form, sieved and stored in plastic bottle until further analysis for biochemical parameters. The carbohydrate was estimated by using phenol sulphuric acid method (Dubois et al., 1956). The concentration of proteins was determined by Lowry's method (1951) whereas the total lipid was extracted by soxhlet extraction method (Folch et al., 1957). Ash or total inorganic content and moisture were also determined by the standard method of A.O.A.C (1990).

2 Results and Discussion

The total length with tail, standard length and width of *Scomberoides tol* was greater than the other two species *Liza vaigiensis* and *Rastrelliger kanagurta* (Table 1). The mean total length with tail of *Scomberoides tol* was 10.8 ± 0.2 cm and both *Liza vaigiensis* 8.7 ± 0.23 cm and *Rastrelliger kanagurta* have 8.7 ± 0.1 cm whereas standard mean length of *Scomberoides tol* was 9.6 ± 0.34 cm and both *Liza vaigiensis* and *Rastrelliger kanagurta* have 8.4 ± 0.22 cm and 8 ± 0.2 cm respectively. The width of *Scomberoides tol* was 3.2 ± 0.23 cm and both *Liza vaigiensis* and *Rastrelliger kanagurta* have 2.5 ± 0.24 cm and 2.5 ± 0.34 cm respectively.

The mean fresh weight of *Scomberoides tol* (164 ± 2.22 g) was also greater than the other two species *Liza vaigiensis* (140 ± 2.4 g) and *Rastrelliger kanagurta* (122 ± 2.13 g) like size (Table 2). Whereas mean dry weight of *Scomberoides tol* was (48 ± 2.8 g) *Liza vaigiensis* (38 ± 2.11 g) and *Rastrelliger kanagurta* (32 ± 2.0 g). The water

content was high in *Rastrelliger kanagurta* (73.7%) as compared to *Liza vaigiensis* (72.8%) and *Scomberoides tol* (70.7) (Table 2).

Table 1 Variation in average size of fishes (*Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol*) collected from Sonmiani Balochistan coast

Fish name	Total Length with tail	Standard Length without tail	Width
<i>Liza vaigiensis</i> (Squaretail mullet)	8.7±0.23	8.4±0.22	2.5
<i>Rastrelliger kanagurta</i> (Indian Mackerel)	8.7±0.1	8±0.2	2.5
<i>Scomberoides tol</i> (Queen fish)	10.8±0.2	9.6±0.34	3.2

Table 2 Variation in water content of fishes (*Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol*) collected from Sonmiani Balochistan coast

Fish name	Fresh weight (g)	Dry weight (g)	Water %
<i>Liza vaigiensis</i> (Squaretail mullet)	140±2.4	38±2.11	72.8
<i>Rastrelliger kanagurta</i> (Indian Mackerel)	122±2.13	32±2.0	73.7
<i>Scomberoides tol</i> (Queen fish)	164±2.22	48±2.8	70.7

The highest carbohydrate content was found in *Liza vaigiensis* (22%) as compared to other species *Scomberoides tol* (20.4%) and *Rastrelliger kanagurta* (13.3%) (Figure 2). Protein concentration was high in *Scomberoides tol* (52%) as compared to other species *Liza vaigiensis* (48%) and *Rastrelliger kanagurta* (40%) whereas ash was high in *Rastrelliger kanagurta* (37.5%) and low in *Liza vaigiensis* (20%) and *Scomberoides tol* (21%) (Figure 2). The mullet fish *Liza vaigiensis* has high concentration of moisture (6%) as compared to both mackerel fishes *Rastrelliger kanagurta* (4%) and *Scomberoides tol* (2%) (Figure 2).

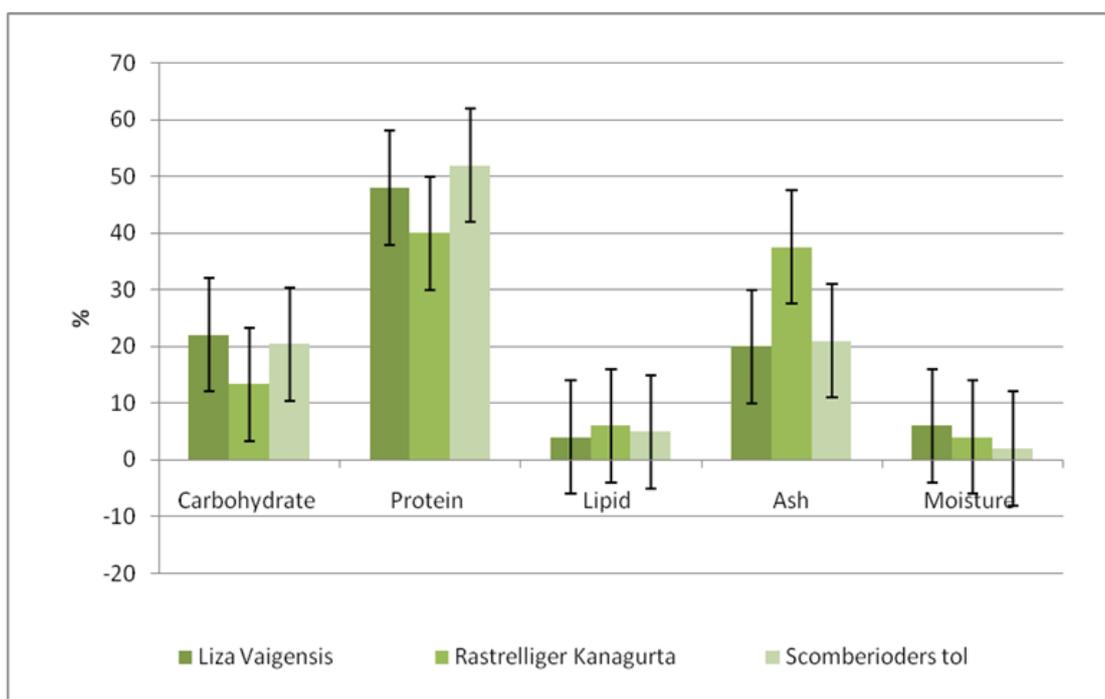


Figure 2 Biochemical compositions of *Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol* collected from Sonmiani Balochistan coast

Correlation of both total length and width with fresh weight was $r^2 = 0.904$ (Figure 3; Figure 4). Both total and standard length and width have positive significant relationship with carbohydrate ($r^2 = 0.642$, $r^2 = 0.807$ and $r^2 = 0.642$ respectively) and moisture ($r^2 = 0.866$, $r^2 = 0.721$ and $r^2 = 0.866$ respectively) (Figure 5; Figure 6). It is also observed that there was positive significant relationship was found in between biochemical constituents of *Scomberoides tol* and *Rastrelliger kanagurta* ($r^2 = 0.935$), *Scomberoides tol* and *Liza vaigiensis* ($r^2 = 0.995$) and *Rastrelliger kanagurta* and *Liza vaigiensis* ($r^2 = 0.937$) (Figures 7; Figure 8; Figure 9).

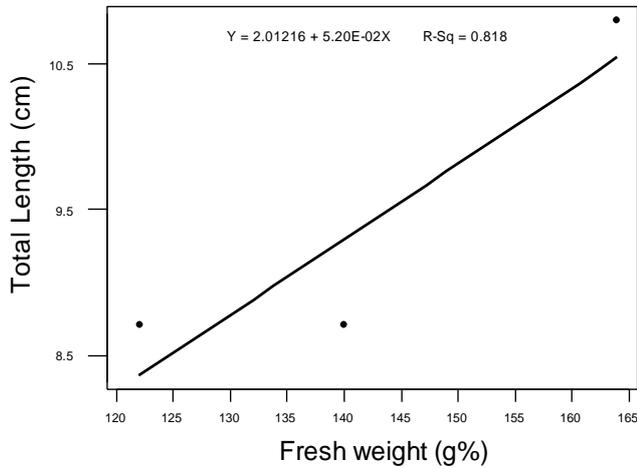


Figure 3 Correlation of total length with fresh weight

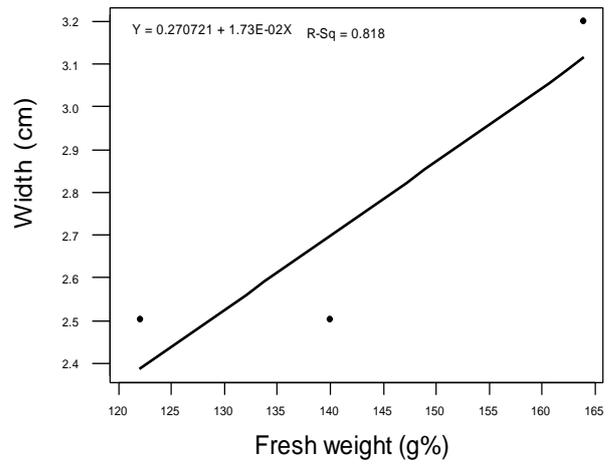


Figure 4 Correlation of width with fresh weight

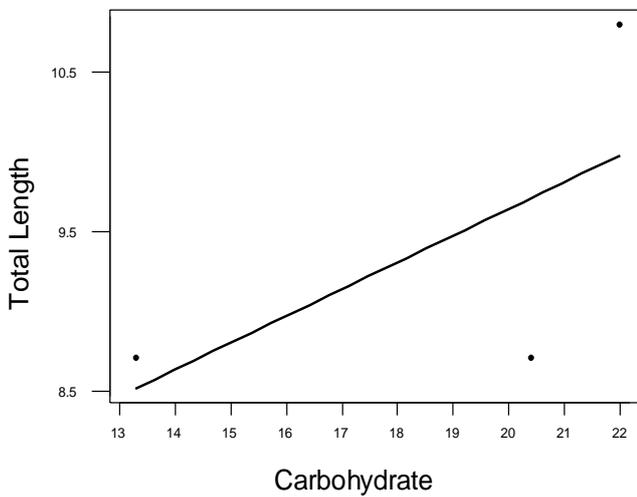


Figure 5 Relationship between total length and carbohydrate of *Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol* collected from Sonmiani Balochistan coast

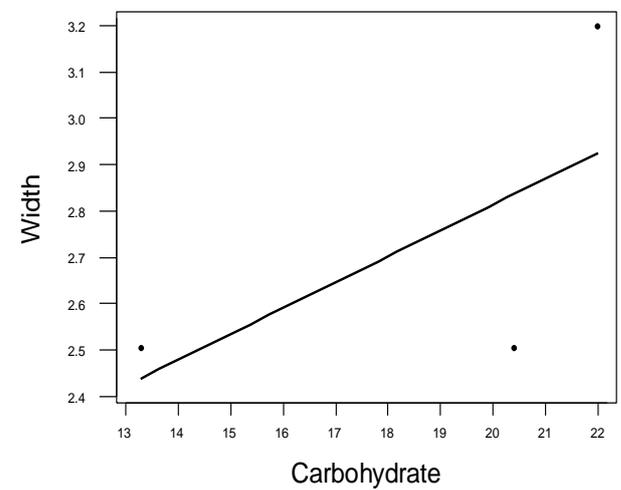


Figure 6 Relationship between width and carbohydrate of *Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol* collected from Sonmiani Balochistan coast

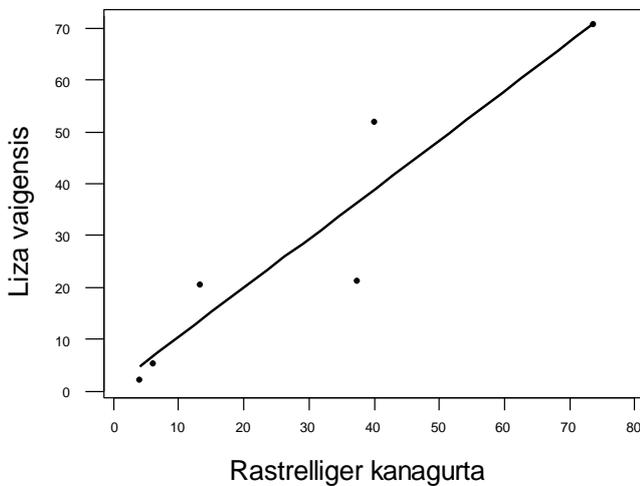


Figure 7 Relationship between biochemical constituents of Squaretail mullet and Indian mackerel collected from Sonmiani Balochistan coast

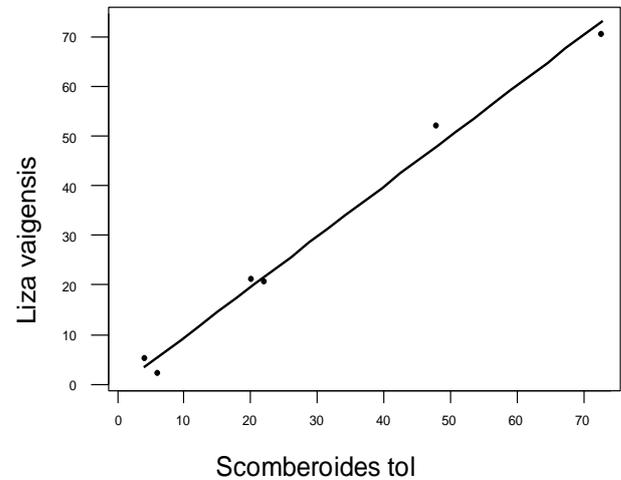


Figure 8 Relationship between biochemical constituents of Queen fish and Squaretail mullet collected from Sonmiani Balochistan coast

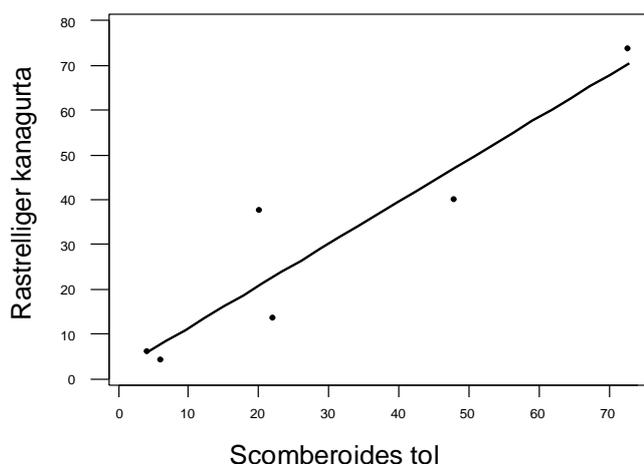


Figure 9 Relationship between biochemical constituents of Indian mackerel and Queen fish collected from Sonmiani Balochistan coast

Results analysis on the analysis of biochemical composition of marine fishes of Balochistan *Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol* are very similar with results obtain from seawater of Pakistan (Munshi et al., 2005; Nisa and Asadullah, 2011) and other marine water fishes like Elham (1991) and fresh water (Anwarul, 2015; Anthony et al., 2016). The values obtained for lipid in the present study are similar to the results of Anthony et al. (2016). Whereas protein values are greater than the results obtain by Elham (1991) and Anthony et al. (2016). It is also noted that an inverse relationship is found in between carbohydrate and moisture in the present study.

Water serves as a medium of transportation for food substances such as protein, fat and carbohydrate to the cell, organs and various parts of the fish. From the present observation it may be concluded that high ash content was associated with high minerals both major and minor elements. The variation in biochemical composition in between all three fishes is may be due to the variation in the movement that they perform and quality and quantity of food that they are eat (Murray and Burt, 1969). Today man need is energy rich food; therefore it is necessary to find out new small and large fishes that are available abundantly all the year round. In present study all three fishes available all year round are good in palatability and suitability for man consumption.

3 Conclusions

From the results it is concluded that these studied fishes (*Liza vaigiensis*, *Rastrelliger kanagurta* and *Scomberoides tol*) are good protein source (40-52%). Further experimentation should be conducted with the samples of season through a year for getting biochemical variation in a year. It is also concluded that information and knowledge of biochemical composition are also the important factor for the consumption and marketing of fishes besides the taste, weight, size and freshness.

Authors' contributions

Munir Z. and Aslam F. carried out the field work for data collection and also conducted the experiment. Qari R. designed, interpreted the data, made figures, statistical analysis, and drafted the manuscript.

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