Biochemical Composition of Rastrelliger Kanagurta Cuvier, 1816 from Waters of Sri Vijaya Puram, Andaman & Nicobar Islands

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Abstract

Marine fishes are known to contain high-quality protein, fatty acids. They play important role as nutrient in providing protection from heart disease, enhancing immunity, bone strength. Understanding biochemical composition of fish helps to understand the nutrient value of the fish. The present study is carried out to find any differences in the muscle of male and female *Rastrelliger kanagurta*. Results of the present study show there is no significant differences in the biochemical composition of male and female *R.kanagurta*.

Key words: *Rastrelliger kanagurta*, Biochemical composition, Protein, lipid, carbohydrates

Introduction

The coastline of India is 8129 Km with EEZ of 2.02 million Sq.Km. It includes 0.5 million Sq. Km. of continental shelf. The marine sector contributes 3.9 million tonnes per annum of sustainable resource. 58 % of the resource is contributed by the shore water, 34.9 % is offshore waters and remaining 7.1 % by the deep-sea resources. The traditional non-motorized craft constitutes about 2.08 lakh which are about 55000 small scale beach landing crafts with boat motors and bottom trawlers contribute about 51,250 mechanized craft.

Fish forms important component of diet in many societies. Fish meal is source of important nutrients and energy source for human population (Sutharshiny and Sivashanthini 2011). It is also important source vitamins and minerals for all ages (Moghaddam *et. al.,* 2007; Edem, 2009). Nutritionists across the world recommend consumption of fish on regular basis (Blanchet *et. al.,* 2000; Nestel, 2000; Balk *et.al.,* 2004). Fish meat is important source of Poly Unsaturated Fatty Acids (PUFA) that play important role in decreasing cholesterol and preventing coronary heart disease (Nordoy *et. al.,* 2000; Turkmen *et. al.,* 2005). Regular intake of fish along with the diet increases the immunity of the individual against the invasive pathogens due to presence of antimicrobial peptide (Ravichandran *et.al.,* 2010). Grant, 1997 suggested that consumption of fish decreases the risk of heart diseases, dementia and Alzheimer's disease. The consumption of fish by mother raises omega 3 fatty acids which is transferred to their infants through milk. Dyslipidemia associated with diabetes can be controlled by fish oil (Friedberg *et. al.,* 1998). Consumption of fish during pregnancy reduces the risk of delivery of pre-mature baby (Olsen and Secher, 2002).

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Analyzing biochemical composition of fish flesh provides information about the quality of the fish (Hernandez *et. al.,* 2001) physiological condition and habitat of the fish can be better understood (Aberoumad and Pourshafi, 2010; Shamsan and Ansari 2020; Ravichandran *et.al.,* 2011). The protein, lipid, vitamins and minerals are the main component of the fish meat which enhances nutritive quality of fish (Steffens, 2006). The nutritive value of the fish varies with the season and from species to species (Takama *et. al.,* 1999; Varljen *et. al.,* 2003). The nutritive value of any edible organisms depends on its biochemical composition (Nagabhushanam *et. al.,* 1978). As the world population is growing the demand for protein rich food is increasing especially in developing countries. Among all marine living organisms fish provides high-quality proteins in human diet (Kumaran *et. al.,* 2013). The important reason for adding fish to meal is it contains little amount of saturated fat, high amount of vitamin C and minerals such as Ca,. K, Zn, P & Cu. Fish proteins contain EAA which plays important role in growth, reproduction, maintenance of human beings. Fish meat is also source of essential fatty acids that are not synthesized in human body. Due to increase in health consciousness, human consumption of seafood has increased enormously. *R.kanagurta* is one of the most commonly captured fish species in along the east and west coasts of India and also Andaman and Nicobar Islands. It is an important edible fish species and is important component of commercial catches from this region. The present study is carried out to estimate biochemical composition of male and female *R.Kanagurta*

Materials and Methods

Samples of *R. kanagurta* were collected from fishermen and were transported to laboratory. The study period consists of 3 months starting from August 2020 to October 2020. The samples of length 22 cm to 25 cm were selected. The sample were sacrificed; muscle was collected. The tissue samples are homogenized dried and kept in desiccator for biochemical analysis. The dried samples were finely powdered and subjected to biochemical analysis. Proteins were estimated following method of Lowry *et. al.,* 1951. Carbohydrates were estimated by Dubois *et al.,* 1956 and Lipid content was estimated by Folch *et.al.,* 1957.

Result

The protein content of male & female *R. kanagurta* were estimated in muscle by Lowry *et.al.,* 1951. In male fish the protein content showed slight increase from 19.2 mg/gm in the month of August 2020 to 19.3 mg/gm in the month of October 2020. Similar increasing trend is seen in the case of female fish also. In female fish the protein content is 18.9 mg/gm in the month of August 2020 and increased to 19.26 mg/gm in the month of October 2020. The protein content of male and female *R. kanagurta* are shown in Table 1.

Table 1. Protein content in muscle of male and female *R.kanagurta*

Sl.No	Month	Mean Protein content in the muscle	
		Male mg/gm	Female mg/gm
1	August 2020	19.2 ± 0.3	18.9 ± 0.4
2	September 2020	19.28 ± 0.4	19.24 ± 0.4

3	October 2020	19.30 ± 0.3	19.26 ± 0.3

There is no significant difference in the protein content of male and female *R.kanagurta* when subjected T-test ($p<0.005$)

The lipid component of male and female *R.kanagurta* were estimated in muscle by Folch *et.al.,* 1957. In the male fish the lipid content showed increase from 8.2 mg/gm in July 2020 to 8.6 mg/gm in October 2020. In female fish the concentration of lipid is slightly higher than male fish. The lipid content in female fish in July 2020 is 8.6 mg/gm and it increased to 9.1 mg/gm in October 2020. The lipid component in both male and female fish are tabulated in Table 2.

Table 2. Lipid content in muscle of male and female *R.kanagurta*

Sl. No	Month	Mean Lipid content in the muscle	
		Male mg/gm	Female mg/gm
1	August 2020	8.2 ± 0.2	8.6 ± 0.3
2	September 2020	8.7 ± 0.3	9.1 ± 0.3
3	October 2020	8.6 ± 0.2	9.1 ± 0.3

There is no significant difference in the lipid content of male and female *R.kanagurta* when subjected T-test ($p<0.005$)

The carbohydrate content of male fish in the month of July 2020 is 1.8 mg/gm and increased up to 3.2 mg/gm in the month of October 2020. The carbohydrate content of female fish is slightly less compared to male fish. In July 2020 the carbohydrate content of female fish is found to be 1.7 mg/gm and increased up to 3.0 mg/gm in the month of October 2020. The results of carbohydrate content in male and female *R.kanagurta* are tabulated in Table 3. There is no significant difference in the carbohydrate content of male and female *R.kanagurta* when subjected T-test ($p<0.005$)

Table 3. Carbohydrate content in muscle of male and female *R.kanagurta*

Sl.No	Month	Mean Carbohydrate content in the muscle	
		Male mg/gm	Female mg/gm
1	August 2020	1.8 ± 0.4	1.7 ± 0.5
2	September 2020	2.4 ± 0.4	2.2 ± 0.5
3	October 2020	3.2 ± 0.5	3.0 ± 0.4

There is no significant difference in the carbohydrate content of male and female *R.kanagurta* when subjected T-test ($p<0.005$).

Discussion

In analyzing the nutritional importance of the fish, the biochemical composition of the fish plays important role. Proteins are the macro molecules that form important component of the nutrients in almost of the animals as well as human beings (Sudhakar *et.al.,* 2011). Proteins play important role in maintaining the structure of organs and tissues in all species of fishes. The proteins play important role as enzymes, hormones and also constitute important source of energy. Any deficiency in the protein levels results in the reduction of growth and weight of the fish. Most of the dietary protein is utilized for the growth of fish and the remaining is utilized as source of energy (Kpogue *et.al.,* 2012). The proteins are the component of all cells of the fish body. The membranes of cell and cell organelles also are made up of protein.

The variation in biochemical composition fish varies with feed intake, stages of maturity (Soundarapandian and Ananthan, 2008). The biochemical composition also varies the the seasons, migration pattern. During starvation periods especially during migration, spawning and periods of shortage food the fish depends on the energy reserves of the body. Most of fishes reduce the ingestion of food during breeding season and during this time it depends on reserve food material. Carbohydrates are the source of energy and most of them exist in free state or bound with the proteins. Most of the lipids are utilized in gametogenesis of male and female fishes. In the present study there is no significant difference between and male and female *R.kanagurta* species in their respective biochemical composition during the period of study.

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