



BIOCHEMICAL STUDIES OF FLESH OF *Rastrelliger kanagurta*

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ABSTRACT:

Marine food is an excellent source of tasty, healthy, and high commercial food. Seafood like fish, crab, prawn etc. contained very high amount of protein, carbohydrates, moisture, trace element, vitamin, fatty acid. Now days there are raising awareness among people to their food. Si that marine fish or marine animal has best option for healthy and nutritious solid food. The knowledge regarding the nutritional significance of fish, in counteracting the malnutrition and age associated chronic diseases are relatively scanty. In this an attempt has been has examine to proximity composition, mineral analysis from Mackerel (*R.kanagurta*) . The biochemical parameters were determined using standard experimental protocol. In Mackerel protein contained 2.386 ± 0.086 and carbohydrates 0.513 ± 0.057 where as moisture obtained in flesh of fish 51.14%. The trace elements copper, phosphorus, calcium, potassium, arsenic and chloride are present. Among of them potassium content more amount than other elements, which is 38.47%. This results shows that fish of Mackerel have a good supply of mineral and it can be used for enhancing mineral intake and protecting the community from mineral deficiency diseases.

KEY WORD- Biochemical, Protein , carbohydrate, *Rastrelliger kanagurta* .

Introduction

The increase in human population that led to shortage of animal protein sources all over the world directed the attention to fish as rapid and healthy compensatory source of good quality animal protein. The increase in human population in India that simultaneously decrease of animal protein (Wealthy and Gil, 1998). Some lower poverty people, uneducated and unaware people eat different type of animal meat which impact on their health. According to national family health survey of India many of the people are very lean or very fat because of unhealthy diet. Particularly in our country women and kids are facing the problem of malnutrition. The unavailability of important nutrition in food may cause different diseases like common cold, diarrhea that kill malnourished child. A fact revealed from a study 2.1 million children from India are died before they reached at age of 5 in every year only because of the scarcity of the food or unhealthy diet. So there is need to find a way to serve this problem (Satanceby, 1962). Under nutrition, malnutrition and starvation cause major problem developing and under developing countries like India, Pakistan, Sri Lanka etc. Marasmus (chronic deficiency of calories) and

kwashiorkor (chronic protein deficiency) are two diseases commonly seen in children due to malnutrition (Rose and Connolly, 1993; Marchioli, 2001; Sushi, 2003).

Fish is one of the important sources of animal protein which is easily available in local market in cheap price. This is also easily digestible compound than other animal protein. Essential fatty acid, protein, carbohydrate, lipid, trace element, minerals are present in fish. Fish carries protein in its muscle. Fish protein has high digestibility and is considered term of high biological and growth promoting value. Currently this time period people are more conscious and prefer to take better nutritional food. There are many small tiny fishes available easily in local market for whole time period of a season. But people have knowledge regarding the nutritional value of fishes is low.

Fish consumption is of growing importance because it provides the high content of health omega-3-PUFAs, particularly eicosapentaenoic acid (20:5n-3, EPA) and docosahexaenoic acid (22:6n-3, DHA) (Elvevoll *et al.*, 2000).

Varljen *et al.*, 2003 studied on lipid classes and fatty acid composition of *Diplodus vulgaris* and *Conger canger* originating from the Adriatic Sea. Their study reported that both fish species contain appreciable levels of n-3-polyunsaturated fatty acids (PUFA) and would be suitable for highly unsaturated low fat diets.

Nazeer *et al.* 2008 reported that a major content of lipid was accumulated in liver (6.22%) when compared with remaining organs like muscle (2.7%) and skin (1.0%). However, the muscle contained more cholesterol than liver and skin. The vitamin contents and fatty acids composition of Rainbow Trout (*Ondorynchus mykiss*) from the region of Central Bulgaria was investigated by Starcheva *et al.*, 2010. Their study revealed that the lipid fraction contains sustainable amounts of fatty acids and fair contents of fat soluble vitamins (A, E, D₃) in the fresh edible tissues of Rainbow trout.

Sutharshiny *et al.*, 2011 studied on total lipid and cholesterol contents in the flesh of the five important commercial fishes from water bodies around Jaffna Peninsula, Sri Lanka. Similarly, Daniel *et al.*, 2015 studied on proximate composition of three commercial fishes commonly consumed in Akwa IBOM state, Nigeria and pointed out that the studied fishes were rich in crude protein, lipid, moisture and ash needed for nutritional requirements of human being.

Ashraf and co-workers (Ashraf *et al.*, 2011) worked on nutritional values of wild and cultivated silver Carp (*Hypophthalmichthys molitrix*) and grass carp (*Ctenopharyngodon idella*). Their study revealed that Grass Carp contained higher protein and lipid contents and lower moisture contents than Silver Carp.

Method and methodology:

Fish sample were collected from Jatani fish market. Tail, head, scale and outer skin was removed from fishes. Muscles was separated from Mackerel fish to prepare fish mince. These mince were dried in oven at 100 for 24 hours. These dried samples were crushed and made fine powder by motor and pestle. These fine homogenized fish muscle powder was used for various biochemical analysis.

Protein Estimation:

Protein estimation was done by Lowry's method.

Method

6 test tube were taken.out of them first test tube was filled by 1 m.l distilled water.Next 4 Test tube were filled by a puppet amount of 0.2,0.4,0.6,0.8 standard solution respectively and make up the volume to 1 ml by distilled water.Made a solution with 0.5 GM sample powder and 10 ml of buffer solution ,in a test tube. That test tube wS centrifuged in 8000 RPM for 20 minutes s d 1 ml of supernatant was collected by 6 the test tube.5ml of reagent C was added in all of those test tube and incubated them for 15 minutes at 37°CThe next step was after incubation 0.5 ml of Reagent D was added in each test tube and uncubatevthem for 30 minutes at 37°CThen O.D was observed on Spectrophotometer at 630 wavelength.

Carbohydrates estimation:

Carbohydrates estimation was done by Hedge and Hofreiter method .

Methods:

Weighed 100mg of sample into a boiling tube. Hydrolysed by keeping the boiling tube in boiling water bath for 3 hours with 5ml of 2.5 N-HCl and allowed to cool in room temperature. Neutralized with solid sodium carbonate untill the effervescence ceases. Make up upto volume to 100 ml and centrifuged. Collected the supernatant and take 0.5 and 1 ml aliquots for analysis. Standard solution taken 0.2,0.4,0.6,0.8 and 1 ml of the working standard solution. '0' serves as blank. Naked up by volume to 1 ml in all the tube including the sample tube by adding distilled water.4 ml of Anthrone reagents was added. Those tubes were headed for 8 minutes in a boiling water bath .After that it was allowed to cool rapidly and was read the green to dark green colour at 630 nm. Then O.D value is observed by Spectrophotometer.

Mineral estimation :

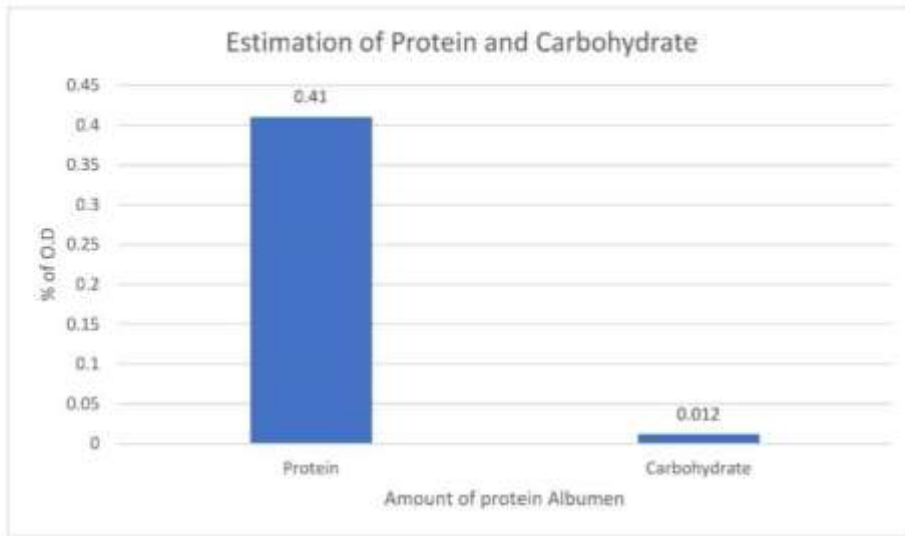
Mineral composition was estimated by XRF method in ATC lab,CUTM, Bhubaneswa

Estimation of Moisture content:

Estimation of the moisture content was carried out by drying the wet flesh of *R.Kanagurta* in hot air for 24 hour in 105°C. The difference in weight was calculated and expressed as percentage moisture content of the sample. Percentage was calculated by the following formula

$$\text{Percentage (\%) of moisture} = \{(\text{wet weight}-\text{Dry weight})\div\text{wet weight}\}\times 100$$

Results and Discussions



Mackerel fish contain 0.41% of protein and 0.012% of carbohydrate.

<u>Fish Name</u>	<u>Protein (%)</u>	<u>Carbohydrates(%)</u>	<u>Moisture(%)</u>
<u>Rastrelliger Kanagurta</u>	2.386±0.086	0.513±0.057	51.14%

Table 1. protein and carbohydrates result represent the mean \pm standard deviation ,n=5

<u>Com</u> <u>Ound</u>	<u>P2O5</u>	<u>So3</u>	<u>Cl</u>	<u>K2O</u>	<u>CaO</u>	<u>Fe2O3</u>	<u>CuO</u>	<u>ZnO</u>	<u>As2O3</u>	<u>SeO2</u>
<u>Conc</u>	<u>15.68</u>	<u>28.179</u>	<u>8.049</u>	<u>38.470</u>	<u>8.505</u>	<u>0.793</u>	<u>0.02016</u>	<u>0.0000</u> <u>168%</u>	<u>0.01867</u>	<u>0.005</u> <u>63</u>
<u>Unit</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>

<u>Comp</u> <u>Ound</u>	<u>Br</u>	<u>Rb2O</u>	<u>SrO</u>	<u>PbO</u>
<u>Conc</u>	<u>0.03954</u>	<u>0.00513</u>	<u>0.01167</u>	<u>0.0017</u>
<u>Unit</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>

Above proximate composition were different than previous studies like protein and carbohydrates, mineral content. In this study concluded that Mackerel is a cheap source of protein , carbohydrates bwhich is are considered is beneficial to human health.

Protein content:

Protein is the major nutrient in fish and level helps to define their nutritional state of the fish. So that fish could be considered as the potential cost effective source to enhance micronutrients intakes and also it is capable as a complementary food for undernourished children. The study explain the protein contents in the fish Indian Mackerel *R.kanagurta* . Indian mackerel contented 2.386 ± 0.086 protein from 0.5 gram of homogenized fish flesh powder. Shajivand Kannan reported the protein content in 23.63% and Nisa and Asadullah reported protein in Mackerel varied from 16.65% to 20.09% which was varied highest in June and lowest in December. Ravi Chandran et.al. also reported that protein content in Mackerel ranged between 17.04 – 28.01 %. Lakshman et.al. reported protein content in Mackerel 18.5%. According to Jora km et.al. in their experiment Mackerel content 7.89 ± 0.31 .It is similar to the reported of Zurainiet.al (2006). M.M.Rahman et al examined the Mackerel and they got protein 16.88 ± 0.56 in fish .Minnesota Mohanty et.al. reported in her experiment protein content in Indian Mackerel 19.9 ± 0.33 . Bahurmin et.al also reported in his work Mackerel contain 21.6 ± 0.0 protein. According Stanas by 1962 protein content of the fish sample show the fish are high in protein.

Carbohydrates contents:

Carbohydrates is an important constituents of an organism .Carbohydrates formed a minor percentage of total composition to protein in fish. Because glycogen in many marine does not any role to reserve of water living animal fish, so that the carbohydrate present vary low value in fish Mackerel (Jayasree 1994). Carbohydrates is present within cell in a form of polysaccharide glycogen and in the circulating fluid in form of glucose. Carbohydrates in fish are present very of low value. It is because glycogen in marine doesn't so much work to preserve in body tissue because it is utilised to meet the energy requirements when needed by anaerobic glycogen . The carbohydrates present in Indian Mackerel, in this study 0.513 ± 0.057 . The amount of carbohydrates is much lesser than protein . Many authors concluded that carbohydrates content in fish is zero. According to Jayasree et al (1994) carbohydrates present in Mackerel is very low. Phillips et al(1962) says carbohydrates utilised for energy in trout thus spacing protein for building of the body . According to V. Anuradha and A.Praveena carbohydrates present in Mackerel 0.284 ± 0.032863 and 0.28 ± 0.104545 . NibeditaMohanty et . al. reported the amount of carbohydrates in Mackerel is 0.11 ± 0.07 , M.M Raheman et al reported the carbohydrates amount in Mackerel is 1.15 ± 0.8 .

Moisture content:

From my experiment I got amount of moisture 48.85% of fish of Mackerel.The recorded result for moisture were approximately matching from researcher . According to Aubourg et al (2002) , Aubourg and Uglianol (002) and Loads et al (2005) identified moisture contents in Mackerel is 75% to 79% , 78.2% and 77.81% respectively. From the result of Bahurmira et al moisture present in Mackerel 75.0 ± 1.3 . NibeditaMohanty et al result $76.5\pm 1.07\%$ moisture in Mackerel. Research of Hours et al explain $76.2\pm 0.5\%$ moisture contain . M.M.Rahaman reported total 76.64 ± 0.48 moisture are present. Gokiglu and Yerlikaya (2015) and Huss (1995) reported that moisture content of the the fish range between 70-80 . . S.Nazemraya et.al reported in their experiment content in fish is 73.32- 75.05%.

Mineral content

Iron present in mackerel 0.793% in this study. Several studies have considered fish as a major source of iron for children.

Zinc is found 0.168% in Mackerel. Teeny at al (1984) explain that zinc was found to be highest concentration among the element determined in fish sample. However Cu, Mn ,and Zn were also known as essential nutrients which is very few amount in present in this Mackerel.

Calcium present 8.505% in this Result . Fishes generally have higher calcium content than the mean alone. Calcium is important for bone formation and fish is known to be a good source of this mineral especially small fish.

In this study Mackerel contain 38.47% of potassium. Potassium is important for muscle contraction , transmission of impulse in the nerve and sugar metabolism.

Mackerel contain 0.02016% copper like zinc. Copper is also part of many enzymes but occur in very low amount in food. According to Wildman and Medeiros (2000) the recommended daily requirements of copper in human nutrition range between 1.5-2.5 mg.

Selenium, Europium, strontium, Lead oxide, Arsenic are also present in *Rastreligerkanagurta* 0.00563 %, 0.05187%, 0.01167%, 0.0071%, 0.01867% respectively.

Conclusion:

According to the present study explain that Indian Mackerel, marine fish, contain significant amount of essential protein, carbohydrates and minerals, which is a very precise essential nutrients for maintenance of a healthy body and also indicating their capability in amelioration of malnutrition and age associated disorder.

Reference:

Ng TKW (2006) Omega-3 fatty acids: Potential sources in the Malaysian diet with the goal towards achieving recommended nutrient intakes. Malays J Nutr 12: 181-188.

Nisa K, Asadullah K (2011) Seasonal variation in chemical composition of the Indian mackerel (*Rastrelligerkanagurta*) from Karachi Coast. Iran J Fish Sci 10: 67-74.

Sumi E.S, Vijayan D.K, Jayarani R, Navaneethan R, Anandan R, Mathew S. Biochemical Composition of Indian Common Small Pelagic Fishes Indicates Richness in Nutrients Capable of Ameliorating Malnutrition and Age-Associated Disorders.

Journal of Chemical Biology and Therapeutics; 1(2): 112 (2016). 11 Venkataraman R, Chari S.T. Seasonal variation in the chemical composition of mackerel (*Rastrelligerkanagurta* Russel).

