

Nutritive Evaluation of Some Small Indigenous Fishes from Warora Taluka, (M.S.) India

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Abstract

Biochemical analysis of seven small indigenous fishes had been done to evaluate proximate composition of proteins, lipids and carbohydrates. In the present investigation fishes selected for the study were *Garramullya*, *Rasboradaniconius*, *Salmophasiabalooke*, *Puntius sophore*, *Puntius ticto*, *Rita rita* and *Glassogobiusgiuris*. The biochemical composition of the various fish displays disparities depends on seasonal variation, migratory behavior, sexual maturation, feeding cycle etc. All the fishes studied were the source of high protein and low fat with small amount of carbohydrates. Significant changes of nutritional values ($p \leq 0.05$) were observed during this study.

KEYWORDS: Fishes, Nutritive value, Proteins, Carbohydrates, Lipids.

Introduction

In recent years the nutritional importance of aquatic food has increased factually because of scientifically recognized beneficial effects of eating aquatic food. It is estimated that around 60% people in developing countries depends on fish for over 30% of their animal protein supplies (Sujatha *et al.*, 2013).

According to FAO (1991) report, fish normally contains 72% water, 19% protein, 8% fat, 0.5% calcium, 0.25% phosphorus and 0.1% vitamin A, D, B and C etc. Fishes are the good supplement for cereals grains because nutritional point of view man cannot survive on bread diet alone; additionally wholly cereal grains has low protein mass with poor eminence. Cereals particularly low in lysine and methionine which are essential amino acids while fish protein comparatively rich in these amino acids and it contain all other essential amino acids which are required for balanced diet (Talat and Azmat, 2006). Human body needs proteins for its growth and maintenance (Hermann, 2014). Fish is an admirable source of high virtue animal protein.

The role of lipid in cellular metabolism is versatile and plays three main functions i.e. energetic, structural, and bioeffector role. Fish lipid contains polyunsaturated fatty acids (PUFA), especially ω -3 fatty acids that are essential for good health. Fish oil is the best-known food source key ω -3 fatty acids, which includes Eicosapentaenoic acid (EPA) and Docosahexanoic acid (DHA). The main advantage of ω -3 is the lessening of platelet activity (blood clotting) and plaque formation, which in turn can prevent heart attacks. Human coronary artery diseases, improvement of retina, brain development, decreased incidence of breast cancer, rheumatoid arthritis, multiple sclerosis, asthma, psoriasis, inflammatory bowel diseases and regulation of prostaglandin synthesis (Kotilla *et al.*, 2012).

Small indigenous fish species (SIS) are the fishes which have maximum height not more than 25 centimeter (Rooset *et al.*, 2003). In the past SIS were considered as weed fish and eradicated from fish culture pond. Small fishes have less price as compare with big fishes.

Small fishes generally not utilized in the proper way and mostly discarded as the waste by fisherman but all these fishes have rich nutritive values. The drastic reduction of SIS in the natural sources, have given focus to the necessity of culture and conservation of SIS (Wahab, 2003). Small indigenous fishes are the best source of macro and micro nutrients that can play important role in elimination of malnutrition in country (Ahmad and Hassan, 1983).

In Maharashtra District Chandrapur is blessed with a variety of freshwater wetlands, which harbor rich freshwater fish diversity. The district Chandrapur although rich in wetland and fish resources, surprisingly also has problems like malnutrition and farmer committing suicide due to poor economic condition. Present research shows recent data regarding nutritive values of some small indigenous fishes. That create awareness among people about nutritional importance of small fishes.

Material and Methods

Study area- The Warora Taluka is located in eastern Maharashtra. Warora is one of the big Taluka of Chandrapur District. The Warora city is about 44 km away from Chandrapur in NW direction. The Warora Taluka located between 20.02'N to 20.44'N latitude and 78.99'E to 78.21'E longitude. The average rainfall of Warora Taluka 1089.62 mm. March to June can be very dry and hot with ambient temperatures exceeding 40°C.

Fresh fishes were collected from the four archetypal water bodies of Warora Taluka namely Wardha river, Chargaon dam, Anandwan lake and Gandhisagar lake. Fish collection was done during the period from February 2014 to January 2016 once in every month. Fishes were collected from various landing centers with the help of local fisherman. Fishes are transported in the research laboratory by using cold ice box. All the fishes immediately washed with fresh, clean water for the removal of mud, other waste material and dried by using blotting paper. Then fishes were identified with the help of books and standard keys (Day, 1967; Jhingran, 1991; Misra, 2004; Gupta and Gupta, 2006).

Fishes were dissected out for the removal of bones. Only muscles were taken for the experiment. For the proximate analysis, muscle tissues of fishes were taken just below the dorsal fin and above the lateral line. Fish flesh then washed until it was free from blood and placed in plastic bag, sealed and kept in freezer at -20°C before they were analyzed.

Carbohydrates contents were determined by using Anthrone method (Dubois *et al.*, 1956) with the minor modification of Meshram and Baile, (2016), protein contents were determined by Lowery, *et al.*, (1951) method with minor modification of Meshram and Baile, (2016) and lipid contents were determined by using Bligh and Dyer (1959) with some minor modification of Khamankar, (2010). The seven fishes selected for the study were *Garramullya*, *Rasboradaniconius*, *Salmophasiabalooke*, *Puntius sophore*, *Puntius ticto*, *Rita rita* and *Glassogobius giuris*. Biochemical analysis of all the seven species had been done to evaluate the carbohydrate (mg/g), protein (mg/g), lipids (%).

Result and Discussion

Protein, lipids and carbohydrates contents were studied during preset investigation. Carbohydrates is the leading source of energy for alive organisms. Carbohydrates plays very crucial role of fuel and energy source in the cells metabolism (Somaiah *et al.*, 2015).

In the present investigation fish carbohydrates were estimated by following the Anthrone method. The carbohydrate shows 0.51 mg/g to 2.51 mg/g during the study period. The minimum carbohydrate content was observed in the fish *Rasboradaniconius* and *Garramullya* in the month of December and maximum carbohydrate contents was observed

in the month of June in the fish *Glossogobiusgiuris*. Maximum carbohydrates occurs in the month of June may be due to Carbohydrates gradually increases with the maturation of gonads. (Sivakamiet *al.*, 1986, Pillaet *al.*, 2014). As compare with protein and lipids there is less depletion after spawning period (Mathanaet *al.*, 2012, Kurbah and Bhuyan, 2018). Maximum biannual average of total carbohydrates was found to be 1.89 ± 0.45 in the fish *Glossogobiusgiuris* and minimum 0.68 ± 0.13 in the fish *Rasboradaniconius*. During whole study period carbohydrate contents of fish are showed less variation. Pillaet *al.*, (2014) reported same observation during the study of *Lutjanusjohni* fish at Vishakhapatnam coast. Jyrwa and Bhuyan (2016) had stated that, in fishes there is low contents of carbohydrates, may be due to low reserves in the fish body.

Fish is the source of great quality proteins. Fish protein contains all important amino acids required for good health. Proteins are made of nitrogenous compounds. Certain enzymes, hormones, neurotransmitters etc. are made up of proteins (Sujatha *et al.*, 2013).

Proteins are one of the building block material. High protein contents present in fish. Fish proteins were estimated by using Lowry *et al.*, (1951) method. The protein matters were varies between 10.16 mg/g to 19.16 mg/g during the investigation. The minimum protein content was observed in the fish *Rasboradaniconius* in the month of January and maximum protein content was observed in the fish *Puntius ticto* in the month of August. Protein contents were high in all the seasons of year. The least proteins contents were reported during the month of January, February. This result may be due resting period of gonads. The maximum protein was observed after the spawning period mostly in winter season. In the maturing phase of fish most of the proteins are saturated in the gonads but after the releasing of sperms and eggs gonads gone under recovery stage. After spawning food material of fish has been mostly used for building of muscles. Therefore, protein matters of muscles rises. This result are in good agreement with Islam and Joadder (2005).

Total proteins in fishes are depends on their maturity and gonadal development stages. Maximum biannual average of total proteins was found to be 18.01 ± 0.73 in the fish *Puntius ticto* and minimum 10.83 ± 0.5 in the fish *Rasboradaniconius*.

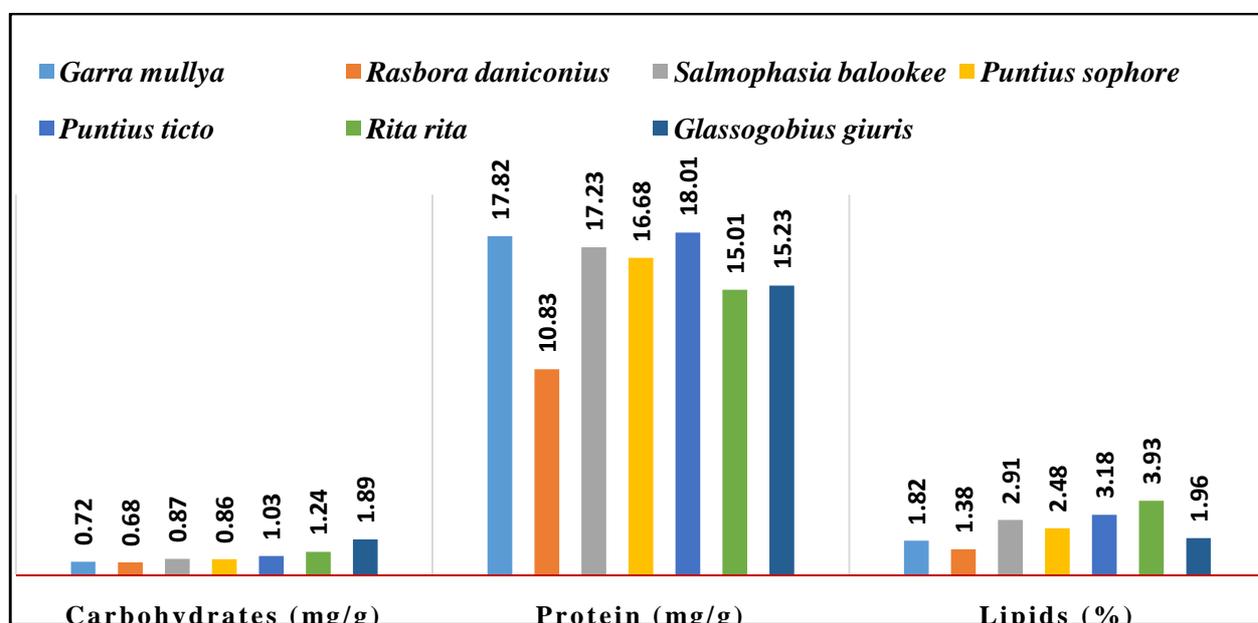
Lipids along with its components are important for biological adaptation of all living beings. Lipids are the compounds play major role in membrane associated work. Osmoregulation, nutrient assimilation and transfer of particles from inner side to outer side and vice a versa. (Sujatha *et al.*, 2013). The lipid contents were varies from 1.01 % to 4.62 % during the study period. The minimum lipid content was observed in the fish *Rasboradaniconius* in the month of December and maximum lipid content was observed in the fish *Rita rita* in the month of June. Maximum biannual average of total lipids was found to be 3.93 ± 0.4 in the fish *Rita rita* and minimum 1.38 ± 0.26 in the fish *Rasboradaniconius*.

Lipid content were maximizes during breeding period. This was may be due to increased demand of energy in breeding period along with high temperature (Jyrwa and Bhuyan, 2016). Lipids in fishes were the vital source of energy. Lipids are useful in the absorption of fat soluble vitamins (A, D, E and K). This is not necessary to have same lipid contents in all fishes of same species. Lipid contents may depends on age differences and maturation stages (Jeyasenta and Patterson, 2014). Total lipids of fish increases before reproductive phases. In reproductive stage lipids required for egg development and sometime used as food (Ravichandranet *al.*, 2011)

Seasonal changes in biochemical composition of fishes were observed. Results were analyzed at significant level $P < 0.05$.

Table No. 1: The Average Nutrient Contents in Seven Fish Commonly Found in Warora Taluka during Year February 2014 – January 2016.

S.No.	Scientific name of fish	Carbohydrates (mg/g)	Protein (mg/g)	Lipids (%)	p – value
1	<i>Garramullya</i>	0.72 ± 0.12	17.82 ± 0.85	1.82 ± 0.42	p < 0.05
2	<i>Rasboradaniconius</i>	0.68 ± 0.13	10.83 ± 0.5	1.38 ± 0.26	p < 0.05
3	<i>Salmophasiabalookee</i>	0.87 ± 0.2	17.23 ± 0.92	2.91 ± 0.67	p < 0.05
4	<i>Puntius sophore</i>	0.86 ± 0.14	16.68 ± 0.39	2.48 ± 0.3	p < 0.05
5	<i>Puntius ticto</i>	1.03 ± 0.17	18.01 ± 0.73	3.18 ± 0.38	p < 0.05
6	<i>Rita rita</i>	1.24 ± 0.28	15.01 ± 0.74	3.93 ± 0.4	p < 0.05
7	<i>Glassogobiusgiuris</i>	1.89 ± 0.45	15.23 ± 0.46	1.96 ± 0.3	p < 0.05

Figure No. 1: The Average Nutrient Contents in Seven Fish Commonly Found in Warora Taluka during Year February 2014 – January 2016.

Conclusion

The present investigation on nutritional profile of some locally available small indigenous fishes provides ample information about richness of healthy nutrients present in fish muscles. Since this study works on locally available and affordable fishes, a larger section of population of Warora Taluka benefits by this investigation. From this study we can conclude that locally available fishes can be a very good source for redressing the problem of malnutrition for the poor and rural peoples.

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