E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2018; 6(5): 127-131

www.fisheriesjournal.com
Received: 18-07-2018
Accepted: 19-08-2018

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Biochemical profile of some of the marine fishes

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Abstract
Research over the past few decades has shown that the nutrients and minerals in fish, and particularly the omega-3 fatty acids found in pelagic fishes, are heart-friendly and can make improvements in brain development and reproduction. This has highlighted the role for fish in the functionality of the human body. Proteins, Carbohydrates and Lipid, which constitute major components of the body, play an important role in body constitution and energy metabolism. Biochemical composition determines the fish quality. Fish protein is relatively of high digestibility, biological and growth promoting value for human consumption. Today, fish is the only important food source that is still primarily gathered from the wild rather than farmed—with marine capture historically accounting for >80% of the world's fish supply. Total landings from marine fisheries increased ~5-fold in the 40-year period from 1950 to 1990. More recently, however, capture fisheries have not been able to keep pace with growing demand, and many marine fisheries have already been over-fished. In the period 1990–1997, fish consumption increased by 31% while the supply from marine capture fisheries increased by only 9% (FAO, 1999). This has intensified the pressure on the harvesters, which has translated into increased pressures on, and over-fishing of, many commercial fisheries. Nearly half of the known ocean fisheries are completely exploited and 70% are in need of urgent management. Taking into account the vastness of marine fishes and its exploitation, the present work on "biochemical profile of some of the marine fishes" has been selected.

Keywords: Marine fishes, biochemical profile, nutrient value

1. Introduction
Historically, the oceans were considered limitless and thought to harbor enough fish to feed an ever-increasing human population. However, the demands of a growing population, particularly in poorer countries, now far outstrip the sustainable yield of the seas. At the same time as fishing has become more industrialized, and wild fish stocks increasingly depleted, aquaculture production—fish and shellfish farming—has grown rapidly to address the shortfalls in capture fisheries. But aquaculture has come under intense scrutiny and criticism as environmentalists fear that it could cause significant environmental problems and further impact wild species that are already threatened. Indeed, both capture fisheries and aquaculture must have environmental costs—all human activities of significant scale do—but it is necessary to fairly evaluate and compare the ecological and economic impact of both. In fact, a thorough analysis shows that the ecological threat of aquaculture is much lower than continuing to supply the majority of fish protein from wild capture.
Fish is a vital source of food for people. It is man's most important single source of high-quality protein, providing ~16% of the animal protein consumed by the world's population, according to the Food and Agriculture Organisation (FAO) of the United Nations (1997). It is a particularly important protein source in regions where livestock is relatively scarce—fish supplies <10% of animal protein consumed in North America and Europe, but 17% in Africa, 26% in Asia and 22% in China (FAO, 2000). The FAO estimates that about one billion people world-wide rely on fish as their primary source of animal protein (FAO, 2000). Today, fish is the only important food source that is still primarily gathered from the wild rather than farmed—with marine capture historically accounting for >80% of the world's fish supply. Total landings from marine fisheries increased ~5-fold in the 40-year period from 1950 to 1990[1]. More recently, however, capture fisheries have not been able to keep pace with growing demand, and many marine fisheries have already been over-fished. In the period 1990–1997, fish consumption increased by 31% while the supply from marine capture fisheries increased by only 9% [2]. This has intensified the pressure on the harvesters, which has translated into increased pressures on,

and over-fishing of, many commercial fisheries. Nearly half of the known ocean fisheries are completely exploited [2], and 70% are in need of urgent management [3].

Capture fisheries have advanced to the point where newly discovered fish populations can be put under severe stress more quickly than regulators can collect needed biological data and impose catch limitations. Based on the current assessment of overexploitation of many fish stocks, and overcapacity and overcapitalization of many fishing fleets, concluded that many capture fisheries would probably not be commercially viable without significant government subsidies. However, the private and public investment in increased infrastructure creates a financial inertia that makes it more difficult to reduce the pressure on fisheries [4].

There are not too few fish—there are too many people. If agriculture had not developed to increase the production of terrestrial livestock, we would never have been able to support the current human population. A similar juncture has been reached or passed in fish supplies. Although per capita consumption has not increased substantially, population growth has increased to the point where capture fisheries alone can fill only two thirds of the current demand for fish, thus almost all future demand will have to be met by aquaculture. According to the FAO (2000), 'there do not seem to be any insurmountable obstacles to the continued growth of aquaculture'. Both aquaculture and capture fisheries cause environmental impacts, which can be substantially reduced through further research and improved management. However, if aquaculture is unfairly assigned a negative label through unbalanced ecological assessments, its potential contributions to present and future food securities could be severely compromised. This could be especially devastating in regions where high-quality protein is needed most. Moreover, it would increase the deficit between wild harvest rates and total demand for fish, which will actually further devastate stocks of many marine fish species. These consequences on both human and fish populations would seem to go against the stated intentions and missions of many of the groups currently attacking aquaculture.

2 Materials and Methods

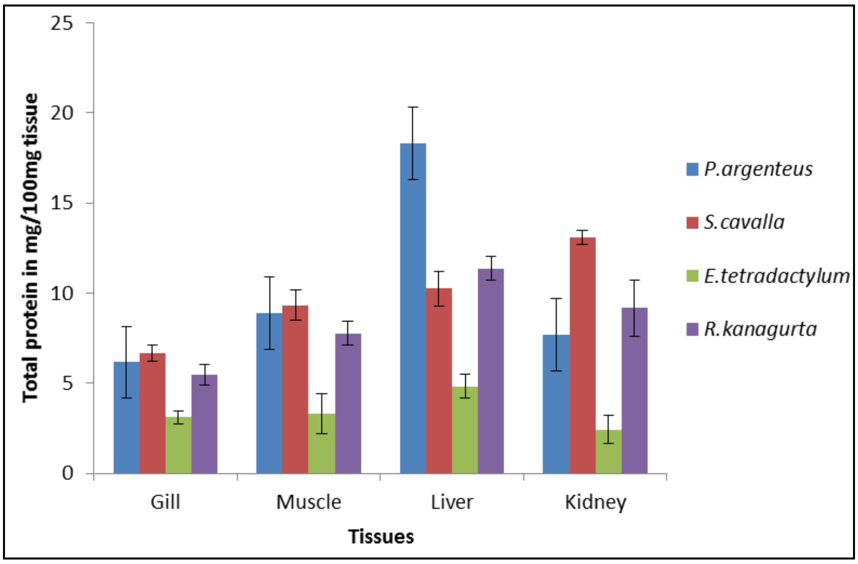
Marine Fish samples were collected from Kolhapur Fish Market, Kolhapur. As these were procured from coastal region Ratnagiri, which is about 120 Km from Kolhapur, they were treated with ice, to prevent spoilage and infection. The fish samples includes: Pomfret (*Pampus argenteus*); King Mackerel (*Scomberomorus cavalla*); Salmon (*Eleutheronema tetradactylum*); and Indian mackerel (*Rastralliger kanagurta*). Biochemical estimation was carried out by using standard methods of Protein by Lowry *et al.*, 1951; Lipid by Barnes and Black stock, 1973; and Glycogen by DeZwaan and Zandee, 1972.

3. Results

Table 1: Protein content from four different organs of marine fishes (mg protein/100mg tissue)

Fishes	Gill	Muscle	Liver	Kidney
P. argenteus	6.16 ± 0.83	8.9 ± 0.49	18.29 ± 0.33	7.68 ± 1.38
S. cavalla	6.66 ± 0.46	13.10 ± 0.39	10.24 ± 0.95	9.33 ± 0.83
E. tetradactylum	3.1 ± 0.36	3.31 ± 1.09	4.83 ± 0.66	2.43 ± 0.77
R. kanagurta	5.46 ± 0.57	7.77 ± 0.65	11.37 ± 0.68	9.17 ± 1.57

(Results Mean ± Standard Deviation)

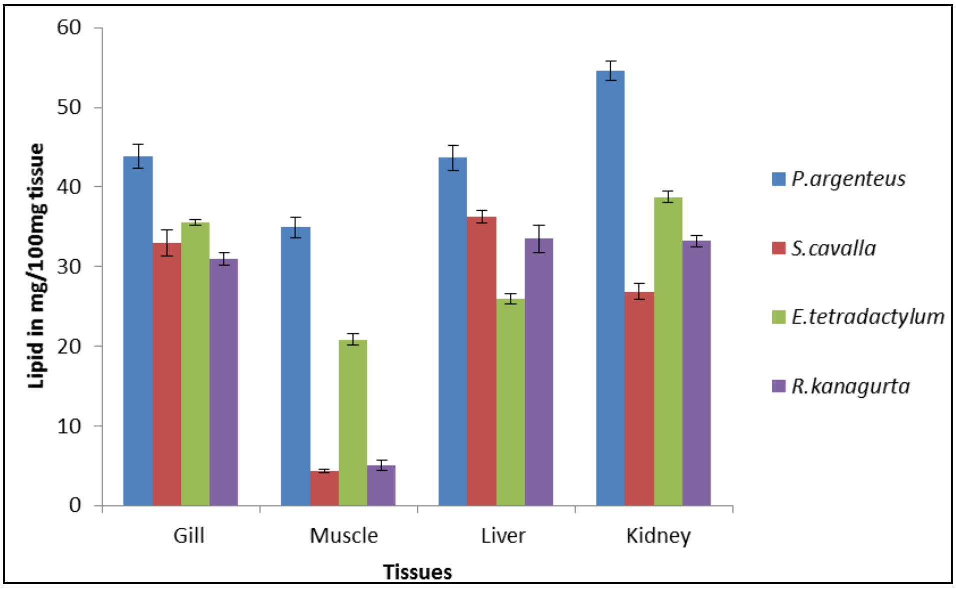


Graph 1: Total protein content (mg/100mg tissue)

Table 2: lipid content content from four different organs of marine fishes (mg lipid/100mg tissue)

Fishes	Gill	Muscle	Liver	Kidney
P. argenteus	43.85 ± 1.55	34.9 ± 1.34	43.68 ± 1.58	54.64 ± 1.23
S. cavalla	32.97 ± 1.6	4.39 ± 0.22	36.2 ± 0.78	26.86 ± 0.97
E. tetradactylum	35.5 ± 0.37	20.84 ± 0.68	25.99 ± 0.62	38.76 ± 0.75
R. kanagurta	30.97 ± 0.81	5.06 ± 0.62	33.5 ± 1.73	33.19 ± 0.7

(Results Mean ± Standard Deviation)

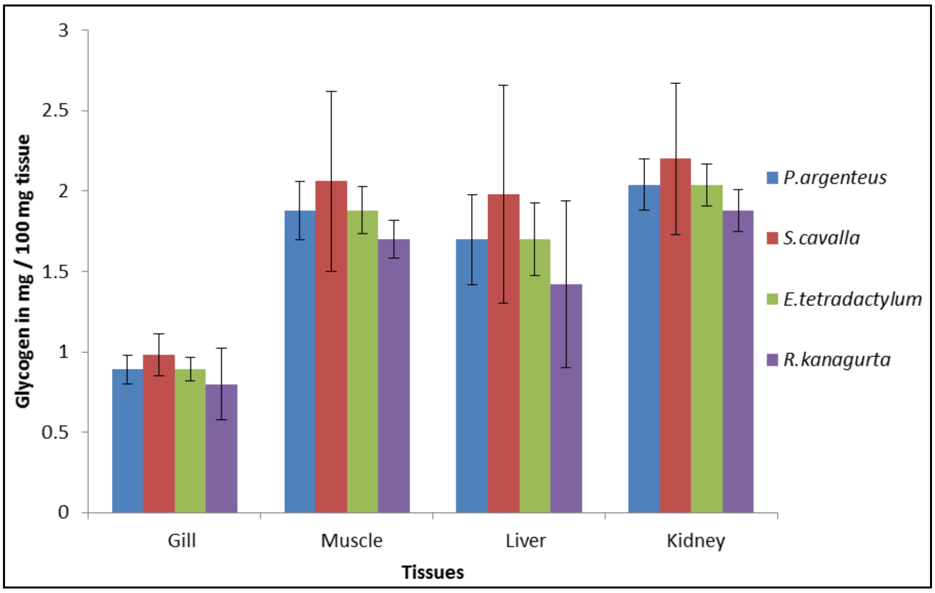


Graph 2: Total Lipid Content (mg/100mg tissue)

Table 3: Glycogen content from four different organs of marine fishes (mg glycogen/100mg tissue)

Tissues	Gill	Muscle	Liver	Kidney
P. argenteus	0.89 ± 0.09	1.88 ± 0.18	1.7 ± 0.28	2.04 ± 0.16
S. cavalla	0.98 ± 0.13	2.06 ± 0.56	1.98 ± 0.68	2.2 ± 0.47
E. tetradactylum	0.89 ± 0.07	1.88 ± 0.14	1.7 ± 0.22	2.04 ± 0.13
R. kanagurta	0.8 ± 0.22	1.7 ± 0.12	1.42 ± 0.52	1.88 ± 0.13

(Results Mean ± Standard Deviation)



Graph 3: Total glycogen content (mg/100 mg tissue)

4 Discussions

The advent of Blue Revolution has become one of the man's great hopes for future food supplies as the human population multiplies and industrialization increases the problem of environmental pollution. Fishes often referred to as "rich food for poor people" provides essential nourishment especially proteins of high biological values and fat. Fish is highly nutritious, tasty and easily digestive. It is much sought after by a broad cross-section of the world's population, particularly in developing countries. It is estimated that around 60 percent of people in many developing countries depend on fish for over 30 percent of their animal protein supplies. However, with the increased awareness of the health benefits of eating fish and then ensuing rise in fish species these figures are rapidly changing. Fish also contains significant amounts of all amino acids particularly lysine. Fish protein can be used therefore to complement the amino acid pattern and improve the overall protein quality of mixed diet. In recent years the nutritional importance of aquatic food has increased substantially because of scientifically recognized beneficial effects of eating aquatic food, fats and oil. Fish contributes enormously to the supply of both macro and micro nutrients in our diet [5].

Malnutrition is a general term that indicates a lack of some or all nutritional elements necessary for human health. Protein Energy Malnutrition- the lack of enough protein and food that provides energy which all the basic food groups provide is the most lethal form of malnutrition/ hunger. It is basically a lack of calories and protein. Fish protein contains all the essential amino acids in required proportions and hence has a high nutritional value, which contribute to their high biological value. Fish is highly portentous food consumed by the populace. A larger percentage of consumers do eat fish because of its availability, flavoring and palatability while fewer do so because of its nutritive valve [6].

4.1 Protein

Proteins are composed of carbon (50%), nitrogen (16%), oxygen (21.5%), and hydrogen (6.5%). Fish are capable of using a high protein diet, but as much as 65% of the protein may be lost to the environment. Most nitrogen is excreted as ammonia (NH_3) by the gills of fish, and only 10% is lost as solid wastes. Accelerated eutrophication (nutrient enrichment) of surface waters due to excess nitrogen from fish farm effluents is a major water quality concern of fish farmers. Effective feeding and waste management practices are essential to protect downstream water quality.

4.2 Lipids (fats)

Lipids (fats) are high-energy nutrients that can be utilized to partially spare (substitute for) protein in aquaculture feeds. Lipids supply about twice the energy as proteins and carbohydrates. Lipids typically comprise about 15% of fish diets, supply essential fatty acids (EFA) and serve as transporters for fat-soluble vitamins. A recent trend in fish feeds is to use higher levels of lipids in the diet. Although increasing dietary lipids can help reduce the high costs of diets by partially sparing protein in the feed, problems such as excessive fat deposition in the liver can decrease the health and market quality of fish [7].

4.3 Carbohydrates

Carbohydrates (starches and sugars) are the most economical and inexpensive sources of energy for fish diets. Although not essential, carbohydrates are included in aquaculture diets to reduce feed costs and for their binding activity during feed manufacturing. Dietary starches are useful in the extrusion manufacture of floating feeds. Cooking starch during the extrusion process makes it more biologically available to fish.

In fish, carbohydrates are stored as glycogen that can be mobilized to satisfy energy demands. They are a major energy source for mammals, but are not used efficiently by fish. For example, mammals can extract about 4 kcal of energy from 1 gram of carbohydrate, whereas fish can only extract about 1.6 kcal from the same amount of carbohydrate. Up to about 20% of dietary carbohydrates can be used by fish. In terms of nutrition, fish is considered as a rich source of proteins, lipids and micronutrients which are comparatively high from other animals. Fish mainly assimilated proteins in its muscles. Fish proteins has relatively high digestibility and is considered to have a high biological and growth promoting factor. For the analysis of biochemical contents of different body organs in different species, we used four types of species for our study where four different body organs are used i.e. gills, muscles, liver and kidney respectively. Focusing on major biotechnical components i.e. protein, lipid, and glycogen estimatation carried out with respective methods. After the analysis of biochemical in four species the results showing that the amount of protein lipid and glycogen is varies organ to organ. By comparative study of protein in different species, from study it clears that in liver of *P. argenteus* shows maximum content of protein whereas gills shows minimum content of proteins. The muscles of *S. cavalla* shows maximum content of protein whereas minimum contents of protein was found in gill. The kidney of *E. tetradactylum* shows maximum content of proteins whereas gills contains minimum amount of proteins. The liver of *R. kanagurta* shows maximum amount of protein whereas gills contain minimum amount of protein[8].

Lipid estimation demonstrates that, kidney of *P. argenteus* has maximum content of lipid, whereas muscles show minimum content of lipid. The liver of *S. cavalla* shows maximum content of lipid whereas minimum contents of lipid was found in muscle. The kidney of *E. tetradactylum* shows maximum content of lipid whereas muscles has minimum amount of lipid. The liver of *R. kanagurta* shows maximum amount of lipid whereas muscles contents minimum amount of lipid [9].

Estimation of glycogen demonstrates**,** kidney of *P. argenteus* shows maximum content of glycogen. Whereas gills shows minimum content of glycogen. The kidney of *S. cavalla* shows maximum content of glycogen whereas minimum contents of glycogen were observed in gills. The kidney of *E. tetradactylum* shows maximum content of glycogen whereas gills contents minimum amount of glycogen. The kidney of *R. kanagurta* shows maximum amount of glycogen whereas gills contents minimum amount of glycogen.

5 Conclusions

Nutrition is core pillar of human development. High prevalence of low birth weight, high morbidity and mortality in children and poor maternal nutrition of the mother continue to be major nutritional concerns in India. Clearly, this situation emphasizes the need for examining several issues of nutritional significance. One among the issues is the dearth of information about the nutritional benefit s of our food. Fish is mostly consumed for its delicacy with little knowledge of its nutritional wealth. The current examination on the nutritional profile of edible and economical fishes provides a substantial range of nutritional information, bringing to our attention the richness of healthy nutrients present in the eatable portion of fish. Since it is an attempt on some of the locally available and affordable fishes, a larger section of population of can reap benefits out of this investigation. The study concludes that locally obtainable fish food can be a substantial aid in redressing the problems of malnutrition and can help in pharmaceutical industries to formulate drugs and medicines obtained from biochemical profile of marine fishes.

6 Acknowledgements

Author is thankful to Head, Department of Zoology, Shivaji University, Kolhapur for providing laboratory and other infrastructural facilities towards completion of said work.

7 References

1. Mace PM. Developing and sustaining world fisheries resources: the state of the science and management. In Hancock, D.A., Smith, D.C., Grant, A. and Beumer, J.P. (eds), Second World Fisheries Congress. CSIRO Publishing, Collingwood, Australia, 1997, 98-102.
2. FAO. The State of World Fisheries and Aquaculture, 1998. FAO, Rome, Italy, 1999.
3. MacLennan DN. Technology in Capture Fisheries. Paper presented at the Government of Japan/FAO International Conference on Sustainable Contribution of Fisheries to Food Security, Kyoto, Japan 4–9 December 1995; and 1997. Review of the state of World Aquaculture. FAO

Fisheries Circular No. 886, Rev. 1. Rome, Italy, 1995.
4. Speer L. Marine Fisheries, Population and Consumption: Science and Policy Issues. WRI 1996. World Resources 1996–1997. WRI/UNEP/UNDP/World Bank. Oxford University Press, Oxford, 1995, 365.
5. Robinson EH, Li MH. A Practical Guide to Nutrition, Feeds, and Feeding of Channel Catfish. Bulletin 1041, Mississippi Agricultural and Forestry Experiment Station, Mississippi State, Mississippi, 1996.
6. Naylor RL, Goldberg RJ, Primavera JH, Kautsky N, Beveridge MC, Clay J *et al.* Effect of aquaculture on world fish supplies. Nature. 2000; 405:1017-1024.
7. Nance JM, Scott-Denton E. By-catch in the Gulf of Mexico Shrimp Fishery. In Hancock, D.A., Smith, D.C., Grant, A. and Beumer, J.P. (eds), Second World Fisheries Congress. CSIRO Publishing, Collingwood, Australia, 1997, 1-20.
8. Klesius PH, Shoemaker CA, Evans JJ, Lim C. Vaccines: prevention of diseases in aquatic animals. In Lim, C. and Webster, C.D. (eds), Nutrition and Fish Health. Food Products Press. An Imprint of the Haworth Press, New York, NY, 2001, 317-335.
9. Howgate P. Contribution of Fish Processing to Food Security. Paper presented at the Government of Japan/FAO International Conference on Sustainable Contribution of Fisheries to Food Security, Kyoto, Japan. 1995-1995, 4-9.