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An assessment of the biochemical composition of some fishes

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Abstract
In the present study, Rohu, Mrigala, silver pomfret, pomfret were selected for carrying out estimation of protein and carbohydrate from their body tissue. Authors reported the amount of protein in rohu, Mrigala, silver pomfret, pomfret was 9.406 mg/g, 6.901 mg/g, 8.868 mg/g and in 6.428 mg/g respectively; the carbohydrate content as 0.258 mg/g in Rohu, 3.151mg/g in Mrigala, 0.0097 mg/g in pomfret and 1.69 mg/g in silver pomfret. On the basis of the present study, it can be concluded that, rohu is rich in protein followed by silver pomfret whereas; mrigal contains more carbohydrates as compared to remaining fishes under study.

Keywords: Estimation, protein, carbohydrates, fishes

Introduction
Fishes are rich in having good nutritive value, serving as a food for human being which is a most important group of vertebrates (Prakash and Verma, 2018; Kumar *et al.,* 2020) [13, 8]. There are both micro and macro nutrients present in fish. The macro nutrients are proteins, fats, and carbohydrate, whereas, the micro nutrients like vitamins and minerals are crucial components (Mohanty, 2015) [9]. They are having a high nutritional value and also the medicinal, industrial, aesthetics and religious values. In all over the world, fishes providing a great supplement for diversified and nutritious diet. Consumption of fishes as a food has several health and nutritional profits. It provides low calorie meal but is a good source of high quality proteins. Protein of fishes are highly digestible with well balance amino acids, which keeps us away from various diseases and disorders (Howard and Wylic, 2002) [6]. Many tropical countries suffer from nutritional deficiencies due to a lack of sufficient protein, according to Eyo (2001) [5].
According to Chilma (2006) [4], fish is generally a good source of protein, containing 18-20% (Chilma). Protein and fat are the two most important nutrients found in fish, and their levels tell us how well the organism is able to meet its nutritional needs. Fish have varying chemical compositions depending on the age, sex, environment and season with protein levels ranging from 16-21%, lipids 0.1-25%, ash 0.4-1%, moisture 60-81% and even high moisture content of 96% (Muraleedharan *et. al.*, 1996) [10]. Carbohydrate is a large group of organic compound occurring in foods and living tissues and including sugars, starch, glucose and cellulose. They contain hydrogen and oxygen in the ratio as water [2, 1] and typically can be broken down to release energy in the body. Carbohydrate and protein are the chief nutrients of the animals. They have a variety of functions. The carbohydrate supplies energy in the form of ATP molecules, which are formed during TCA cycle. Even though protein is an important source of energy in fish but stress conditions causes rapid depletion of stored carbohydrate (Verma and Prakash, 2019) [13]. In the present study Rohu, Mrigal, Pomfret, Silver Pomfret were analyzed for their carbohydrate and protein content. So as to know the nutritional status of these fishes we analyzed these fishes.

Materials and methods
In the present study Rohu, Mrigal, Pomfret and Silver Pomfret were analyzed for their protein and carbohydrate content. To know the nutritional status of these fishes we analyzed them. For the estimation of protein and carbohydrate fishes were collected from local fish market of Pathardiphata, Nashik (M.S.) and brought them to laboratory one at a time.1g general body tissue was taken and homogenized then homogenized sample was filtered through blotting paper (image 1 and 2). The homogenized filtrate was used for further estimation.

The protein and carbohydrate content of a particular fish was estimated by using standard procedure. The Carbohydrate was estimated by Anthrone method and Protein was estimated by Folin-Phenol method (Barnes and Blackstoch, 1973) [2]. The standard concentrations of proteins and carbohydrates were taken for standardizations of sample and standard graph was plotted. The graph was plotted by using standard concentration against the optical density. The values obtained through standard graph were added in the formula to calculate the protein and carbohydrate present in the sample.

Image 1: Images showing the procedure of protein estimation

Image 2: Images showing the procedure of carbohydrate estimation

Results and discussion

Carbohydrate and protein are the chief nutrients of the animals. They have a variety of functions. The carbohydrate supplies energy in the form of ATP molecules, which are formed during TCA cycle. Even though protein is an important source of energy in fish but stress conditions causes rapid depletion of stored carbohydrate (Prakash and Verma, 2018; Verma and Prakash, 2019; Prakash, 2020) [13, 21].

Protein is large biomolecule or macromolecule consisting of long chain of amino acids. Protein is an important biomolecule found in fish that helps balance energy in formulation and analysis of fish diets. In the present study protein estimated in Rohu was 9.406 mg/g, in Mrigala it was 6.901 mg/g (Table no. 2). Whereas, in Silver Pomfret 8.868 mg/g protein was estimated and in Pomfret *it was* 6.428 mg /g. Saranya *et al.* (2014) [17] conducted protein estimation in Rohu and reported maximum protein in the month of March which was 20.02 mg/g. This result was also supported by Sivakumar *et al.* (1994) [18]. Saha and Guha (1940) [16] reported that the chemical composition of fish is dependent on age, sex, habitat and seasons. Bruce (1924) [3] and others reported that the protein content was more in fishes during early summer and winter months corresponding to their maturity stages. Anwarul conducted study on Rohu to estimate moisture, ash, fats and protein content. In their study they observed that the amount of protein present in Rohu collected from three different local markets were 17.05%, 18.11%, 17.22%. Tilami and Sampels (2018) [20] said that fishes have numerous health benefits for humans. Furthermore, fish contains minerals and vitamins including vitamin D, selenium, phosphorus, and a wide range of minerals and vitamins (Ali *et al.*, 2020) [1]. According to Sujatha *et al.* (2013) [19], "Fish provides 30 percent of the animal protein eaten by 60 percent of people in many developing countries".

Carbohydrate is the important macromolecule present in fishes also but is often neglected. Fishes are considered only for their rich protein content but some amount of carbohydrates is also present in them. In the present study we estimated carbohydrate from four different fishes such as Rohu, Mrigala, Pomfret, and Silver Pomfret. In Rohu 0.258 mg/g carbohydrate was estimated, in Pomfret 0.0097 mg/g carbohydrate was estimated and in silver Pomfret it was 1.69mg/g. Whereas, in Mrigala3.151 mg/g carbohydrate was estimated (table no. 4) which was highest among all studied fishes. Saranya *et al.* (2014) [17] reported that in Rohu 0.993 mg/g carbohydrate was recorded during December and March.

Table 1: Concentration of standard protein & their O.D.

Concentration of Std. BSA	O.D.
0	0
0.2	0.043
0.4	0.057
0.6	0.073
0.8	0.076

Calculations: - Protein Estimation

Y= mx + C

Where, Y= unknown O.D.

M = slope

x = concentration of known protein

C = intercept.

General formula used for Carbohydrate and Protein estimation is

$$x = \frac{(Y- C)}{m}$$

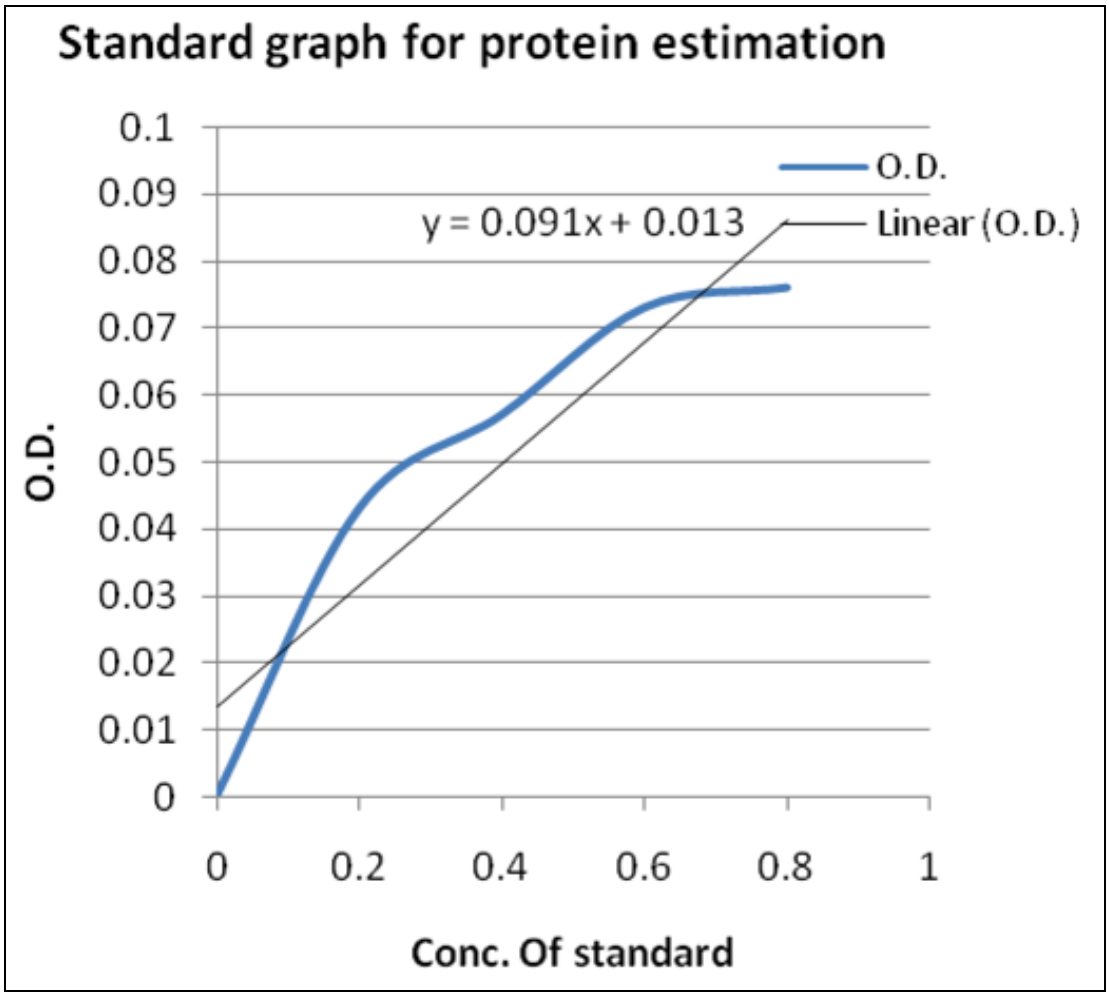

Fig 1: Standard graph for protein estimation

Table 2: Protein estimation of some fishes expressed in terms of mg/g

Protein estimation of some fishes (mg/g)	
Silver Pomfret	8.868
Pomfret	6.428
Rohu	9.406
Mrigala	6.901

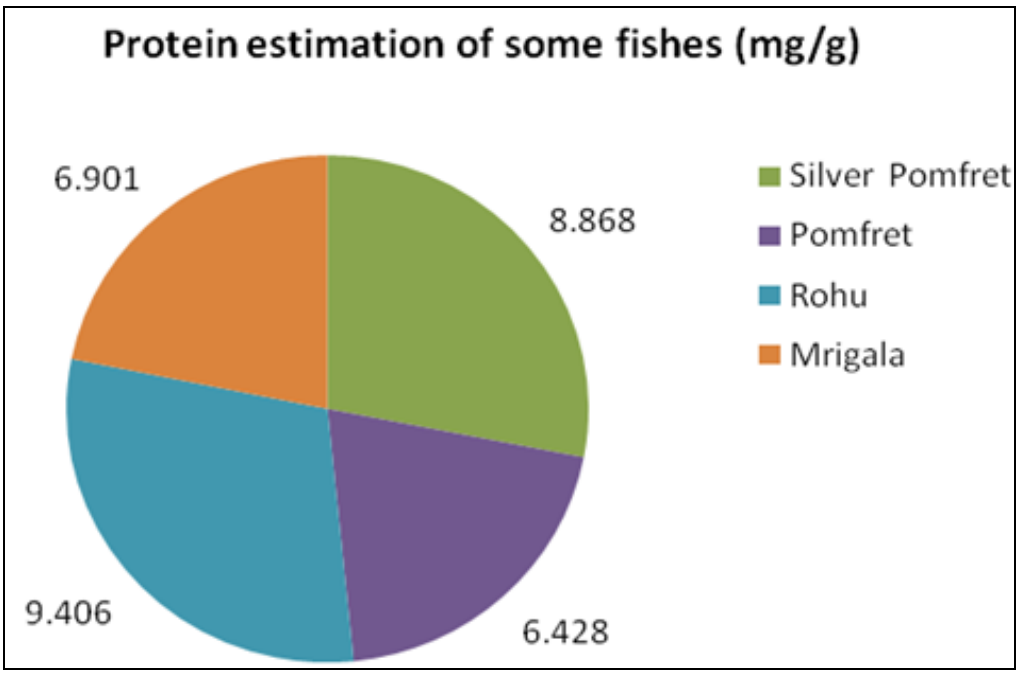

Fig 2: Protein estimation of some fishes (mg/g)

Table 3: Concentration of standard glucose & their O.D.

Concentration of Std. glucose	O.D.
0	0
0.2	0.45
0.4	0.23
0.6	0.38
0.8	0.24

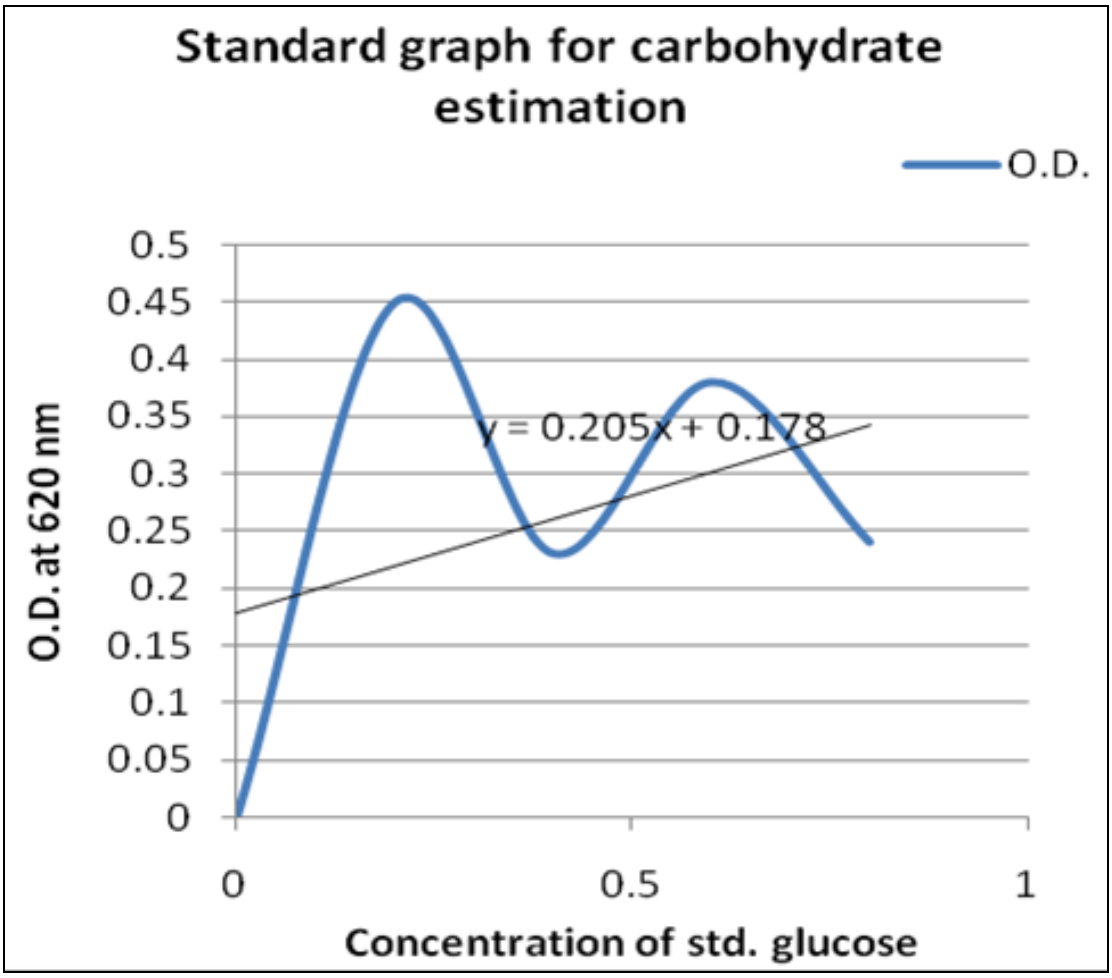

Fig 3: Standard graph for carbohydrate estimation

Calculations: For carbohydrate estimation same formula was used which is given under the standard graph of protein.

Table 4: Carbohydrate estimation of some fishes expressed in terms of mg/g

Carbohydrate estimation of some fishes (mg/g)	
Silver Pomfret	1.69
Pomfret	0.0097
Rohu	0.258
Mrigala	3.151

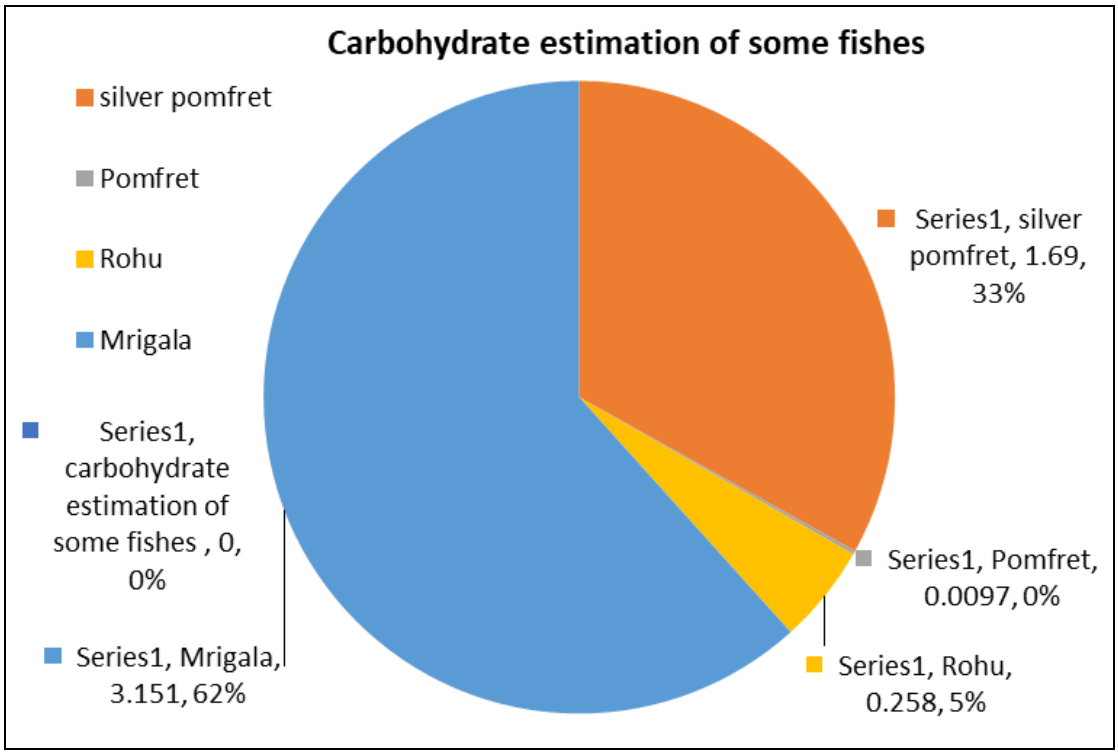

Fig 4: Carbohydrate estimation of some fishes

Conclusion

Rohu is highest source of protein content than Mrigala, Pomfret and Silver Pomfret. *Cirrhinus Mrigala* and Pomfret contain lowest amount of protein. *Cirrhinus Mrigala* contains high amount of carbohydrate in its body tissues. Silver Pomfret has highest carbohydrate content there, whereas Rohu and Pomfret contain less amount of carbohydrate in their body tissues. However a number of researchers reported that toxicant available in water causes significant changes in biomolecules of muscles, liver and kidney of fish (Prakash and Verma, 2019, 2020a, 2020b) [13, 14, 15].

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References

1. Ali SSR, Abdhakir ES, Muthukkaruppan R, Sheriff MA, Ambasankar K. Nutrient Composition of Some Marine Edible Fish Species from Kasimedu Fish Landing Centre, Chennai (TN), India., International Journal of Biological Innovations. 2020;2(2):165-173. https://doi.org/10.46505/IJBI.2020.2213
2. Barnes H, Blackstock J. Estimation of lipids in marine animals and tissues. Detailed investigation of sulphophos -phovanillin method for total lipids., J Exp. Mar. Biol. Ecol. 1973;12(1):103-118.
3. Bruce JR. Changes in the chemical composition of the tissue of the Herring in relation to age and maturity: J., 1924, 469-485.
4. Chilima DM. World Fish Centre, Zambia, 2006.
5. Eyo AA. Fish processing technology in the tropics. National institute for freshwater fisheries research: University of Ilorin press, 2001, 66-70.
6. Howard BV, Wylic Rosett J. Sugar and cardiovascular disease: a statement for healthcare professionals from the committee on Nutrition of the council on nutrition, physical activity and metabolism of the American heart association. Circulation. 2002;106:523-527.
7. Khanna SS. An introduction to fishes. Silver line publications 2006.
8. Kumar A, Bajpeyee AK, Yadav CB. Effects of Dietary vitamin-C on Biochemical and Morphometric parameters of *Labeo rohita.*, International Journal of Biological Innovations 2020;2(2):174-177. https://doi.org/10.46505/IJBI.2020.2214
9. Mohanty BP. Nutritional Value of fish. In: Conspectus of Inland Fisheries Management. A.K. Das and D. Panda (Eds.). ICAR- Central Inland Fisheries Research Institute (Indian Council of Agricultural Research), Barrackpore, Kolkata, W.B, 2015, 700-120.
10. Muraleedharan V, Antony KP, Gopakumar K. Utilization of Unconventional fish resources for Surimi preparation. Proceedings of the Fish resources for Surimi preparation. Proceedings of the second workshop on scientific results of FORV Sagarsampada, Dept. of Ocean development, New Delhi, (India) 1996, 539-543.
11. Prakash S. Toxic Effect of Chlorpyrifos pesticides on the behavior and serum biochemistry of *Heteropneustes fossilis* (Bloch), International Journal of Agricultural Biosciences. 2020;11(1):22-27.
12. Prakash S, Verma AK. Effect of synthetic detergent on biochemical constitutions of freshwater major carp, *Labeo rohita*, International Journal on Agricultural Sciences. 2018;9(1):56-59.
13. Prakash S, Verma AK. Effect of Arsenic on Lipid metabolism of a fresh water catfish, *Mystus Vitatus*, Journal of Fisheries and Life Sciences. 2019;4(1):33-35.
14. Prakash S, Verma AK. Effect of Organophosphorus pesticides on Biomolecules of fresh water fish, *Heteropneustes fossilis* (Bloch), Indian Journal of Biology. 2020a;7(2):65-69.
15. Prakash S, Verma AK. Impact of Arsenic on Protein

metabolism of a fresh water catfish, *Mystus Vittatus*, Uttar Pradesh Journal of Zoology. 2020b;41(5):16-19.
16. Saha KC, Guha BC. Nutritional Investigation on Bengal fish: Indian Journal of Medical Research. 1940;(27):873-876.
17. Saranya S, Saravanan K, Durairaj K, Durga B. Comparative variation of Biochemical Parameters in cultural and Natural fishes, International Journal of Pharmaceuticals and Biological Archives. 2014;5(2):104-107.
18. Sivakumar R, Manikasundaran M, Sivakumaran KP, Ramiyan. Biochemical fishes from parangipettai waters, Journal of Marine Biology, India. 1994;36(1, 2):106-109.
19. Sujatha K, AnithaJoice A, Senthilkumar P. Total protein and lipid content in Edible tissues of fishes from Kashimodu fish landing centre, Chennai, Tamil Nadu, European Journal of Experimental Biology 2013;3(5):252-257.
20. Tilami Sarvenaz Khalili, Sampels Sabine. Nutritional Value of Fish: Lipids, Proteins, Vitamins, and Minerals. Reviews in Fisheries Science & Aquaculture 2018;26(2):243-253.
DOI: 10.1080/23308249.2017.1399104
21. Verma AK, Prakash S. Impact of Arsenic on carbohydrate metabolism of a fresh water catfish, *Mystus vitatus*, International Journal on Biological Sciences. 2019;10(1):17-19.