International Journal of Zoology and Applied Biosciences
Volume 11, Issue 2, pp: 78-81, 2026
https://doi.org/10.55126/ijzab.2026.v11.i02.011
ISSN: 2455-9571
http://www.ijzab.com
Research Article

COMPARATIVE ANALYSIS OF PROTEIN BIOCHEMICAL COMPOSITION IN INDIAN MAJOR CARPS: *CATLA CATLA, LABEO ROHITA, AND CIRRHINUS MRIGALA*

[1]*S. Sornalatha, [2]A. Arul Sundari, [3]M. Sathiamoorthi and [4]M. Esakkiammal

[1*]Department of Zoology, S.T. Hindu College, Nagercoil -629002 (Affiliated to Manonmaniam Sundaranar University) Tirunelveli, Tamil Nadu, India
[2,3]Department of Animal Science, Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India
[4]PG & Research Department of Zoology, St. John's College, Palayamkottai- (Affiliated to Manonmaniam Sundaranar University) Tirunelveli- 627012, Tamil Nadu, India

Article History: Received 26th December 2025; Accepted 14th February 2025; Published 1st March 2026

ABSTRACT

Fish is a good source of protein and other nutrients needed to stay healthy. In the current investigation, protein and other biochemical compositions were anticipated. Estimates indicate that the species *Labeo rohita* contains more protein. The *mrigal* and *Catla catla* are the species whose protein concentrations are being measured. At 88.77±0.17, 84.73±0.34, and 80.77±0.17 mg/g wet weight, the proximate composition of the protein content register was high in comparison to freshwater fish. The results emphasize the importance of food value for the fish in the local fish market in Tamil Nadu, Tirunelveli district. This study provides valuable information on the proximate composition of the fish species to distinguish their nutritional Value and contribution consumers in construction cultured collections.

Keywords: Aquaculture, *Catla catla*, *Labeo rohita*, *Cirrhinus mrigal*, Biochemical composition.

INTRODUCTION

Aquaculture is one of the fastest-growing industries and plays a vital role in the economy of tropical and subtropical countries across the world (FAO 2018). In particular, the freshwater aquaculture sector is the important source of animal protein supply and a major economic driver for the vast majority of developing countries (FAO 2018; Ashaf-Ud-Doulah *et al*., 2019). For example, the freshwater aquaculture sector provides ~60% of total animal protein intake and contributes 3.57% to the GDP in Bangladesh (DoF (Department of Fisheries), 2020; Afroz *et al*., 2021; Lema *et al*., 2024). Worldwide trade of fisheries and aquaculture products has been growing notably in recent years due to the human population explosion and its connected demand for animal protein and micronutrient-rich seafood. Food, fuel, cosmetics, medications, nutraceuticals, and other industrial commodities are among the many goods produced by the aquaculture industry (Ramasamy Ramasubburayan *et al*., 2024). According to the FAO, 2023 report, global aquaculture production steadily increased from 6 million tonnes in 1975 to 126 million tonnes in 2021. In addition to the striking gains, the aquaculture sector faces challenges in combating diseases and achieving sustainability (Naylor *et al*, 2021). Fish consumption has a number of nutritional and health benefits; while offering low calorie meals, it is also a reliable source of high-quality proteins. Fish protein is readily digestible and contains well-balanced amino acids, which protects us from a variety of illnesses and disorders (Howard and Wylic Rosett.2002; Tidme *et al*,.2021). Furthermore, the nutritional greasepaint of a fish's flesh is significantly influenced by its eating habits. Fish flesh contains all of the necessary amino acids for diet and around 85 90% of the digestible protein. A food's proximate composition, such as its protein and fat level, essential regularly be measured to make sure it complies with protocols (Sathiamoorthi and Palavesam, 2024). Fish nutritional value has been the prime focus of biochemical component analysis in India. Considerate the biochemical makeup of various species, including fish, is very beneficial

*Corresponding Author: S.Sornalatha, Assistant Professor, Department of Zoology, S.T. Hindu College, Nagercoil -629002 (Affiliated to Manonmaniam Sundaranar University) Tirunelveli, Tamil Nadu, India. Email: sornalatha0392@gmail.com

for determining their nutritional worth. It also aids in assessing the quality of these natural resources and maximizing their use (Rodríguez-González *et al*,.2006). Cyprinidae, a grouping of around 3000 species that includes eight suborders, 200 genera. cyprinidae can be found in freshwater fishses with the bulk of species being found in the freshwater. It is an excellent source of protein and Omega -3 fatty acids, which Protects our heart, maintain strong bones, lower cholesterol, improve blood pressure and minimize the risk of diabetes and arthritis. Mostly, all pomfrets varieties are high in good fat proteins add vitamins like A, D and B 12. One of the most popular fish in India known rawas, also referred as fresh water fish *Labeo rohita*. This fish is easily obtained and contains essential amino acids that promote muscle growth and maintenance while also accelerating weight reduction.

MATERIAL AND METHODS

Sample Collection

In the present study three commercially important fish species *Catla catla, Cirrhinus mrigal* and *Labeo rohita* were analyzed for their protein content. To know nutritional status of these fishes we analyzed them. For estimation of protein sample of fishes were collected from local fish market of Tamil Nadu, Tirunelveli District Farmer Market. Samples were kept in plastic bags and transported in an insulated ice box to the laboratory one at a time. Fish muscle tissue was homogenized for chemical analysis all the samples were analyzed in triplicates.

Estimation of Protein

The total Protein content of the experimental fish tissue samples was estimated according to modified standard method of (Lowry *et al*., 1951). The Quantity of 5%homogenate of, muscle, and intestine tissues were isolated and precipitated with 5% trichloro acetic acid (TCA) and centrifuged at 3000 rpm for 15 minutes. The precipitate was dissolved in 1 milliliter of 1 N NaOH solution, and 0.2 milliliter of the extract was transferred into a test tube and combined with 5 milliliters of an alkaline copper solution (a 50:1 combination of 2% sodium carbonate and 0.5% copper sulphate). Then samples were allowed to stand for 10 min, at the end of which 0.5 ml folin phenol reagent (diluted with double distilled water in 1:1 ratio before use) was added. After 30 minutes, the optical density was measured at 540 nm in am spectrophotometer (Elico Model SL207) against a blank. The standard graph was plotted using bovine serum albumin (BSA) as standard. The values were expressed as mg/g wet weight of the tissue.

Table1. Protein composition (Mean ± SD) in the muscle tissues of freshwater fishes with Standard Comparison.

Species name	Mean	SD
Catla catla	84.73	0.34
Labeo rohita	88.77	0.20
Cirrhinus mrigal	80.77	0.17

Note: Each value is the mean ± SD of three individual estimates.

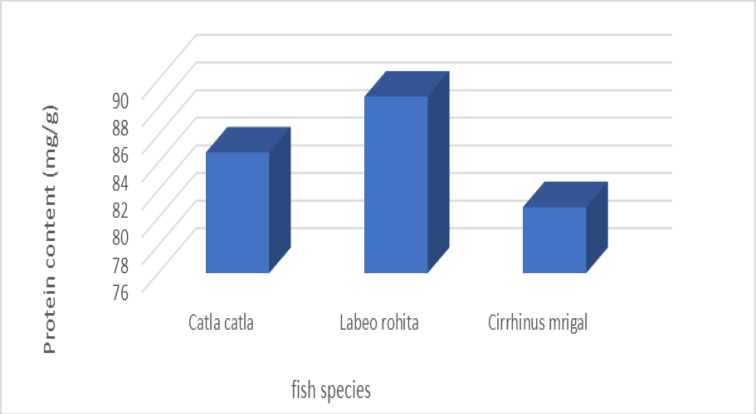

Figure 1. Graphical Representation of Mean Value of Fish species.

RESULT AND DISCUSSION

The changes in biochemical constituents in muscle of fresh water fishes *catla, rohu, mrigal* are provide in Table 1. The tested parameters such as total protein good for both the tissues tested. In muscle tissue of fresh water fishes, the protein content register was 88.77 ± 0.17, 84.73 ± 0.34 and 80.77 ± 0.17 mg/g wet weight and it was high when compared with freshwater fishes. The present study also revealed that the fish muscle contained richer amounts of authenticate with the results obtained by previous researchers (Kari *et al*, 2021; Akter *et al*,. 2016). The study was carried out to find the results about protein content of different fishes and estimate which fish has highest and which is lowest protein content. The total protein content found to be in *Labeo rohita* was (88.77 ± 0.20), *Catla* was (84.73 ± 0.34) mrigal was (80.77 ± 0.20). The protein content was to be highest in *Labeo rohita* (88.77±0.20) and lowest in *mrigal* (80.77 ± 0.20). So, the nutritional value of *Labeo rohita* very high as it was high protein content as compared to the other taken fish samples. Eating foods high in protein can help you reach your fitness goals. Protein is essential for a healthy body and comes in two forms: albumin and globulin. Protein moves hormones, vitamins, minerals, lipids, and other materials. It also helps to balance the osmotic pressure of blood tissue.

CONCLUSION

According to these results, eating fish expands human health because of its biochemical composition which includes protein, carbohydrate, and lipid. Further research is necessary to fully understand the impact of fish protein, as many of the mechanisms are still incompletely understood. The conclusion is that fish muscle is the best and healthiest component to satisfy the human body's protein needs.

ACKNOWLEDGMENT

The authors express sincere thanks to the head of the Department of Zoology, S.T. Hindu College, Nagercoil - 629 002 (Affiliated to Manonmaniam Sundaranar University) Tirunelveli, Tamil Nadu, India) for the facilities provided to carry out this research work.

CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

FUNDING

This study received no specific funding from public, commercial, or not-for-profit funding agencies.

AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

REFERENCES

Afroz, K. B., Shah, M. S., Salin, K. R., & Rahi, M. L. (2021). Growth and survival of diploid and triploid bata, *Labeo bata* (Hamilton, 1822). *Aquaculture, Fish and Fisheries, 1*(1), 42–50. http://dx.doi.org/10.1002/aff2.2.

Akter, M. N., Sutriana, A., Talpur, A. D., & Hashim, R. (2016). Dietary supplementation with mannan oligosaccharide influences growth, digestive enzymes, gut morphology, and microbiota in juvenile striped catfish, *Pangasianodon hypophthalmus*. *Aquaculture International, 24*(1), 127–144. http://dx.doi.org/10.1007/s10499-015-9913-8.

Ashaf-Ud-Doulah, M., Shahjahan, M., Islam, S. M. M., Al Emran, M., Rahman, M. S., & Hossain, M. A. R. (2019). Thermal stress causes nuclear and cellular abnormalities of peripheral erythrocytes in Indian major carp, rohu (*Labeo rohita*). *Journal of Thermal Biology, 86*, 102450. http://dx.doi.org/10.1016/j.jtherbio.2019.102450.

Department of Fisheries. (2020). *National fish week, compendium book* (In Bengali). Ministry of Fisheries and Livestock, Department of Fisheries.

Food and Agriculture Organization. (2018). *The state of world fisheries and aquaculture 2018: Meeting the sustainable development goals*. FAO.

Howard, B. V., & Wylie-Rosett, J. (2002). 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, 106*(4), 523527. http://dx.doi.org/10.1161/01.CIR.0000029552.77778.04

Kari, Z. A., Kabir, M. A., Mat, K., Rusli, N. D., Razab, M. K. A. A., Ariff, N. S. N. A., Edinur, H. A., Rahim, M. Z. A., Pati, S., Dawood, M. A. O., & Wei, L. S. (2021). The possibility of replacing fish meal with fermented soy pulp on the growth performance, blood biochemistry, liver, and intestinal morphology of African catfish (*Clarias gariepinus*). *Aquaculture Reports, 21*, 100815. http://dx.doi.org/10.1016/j.aqrep.2021.100815

Lema, M. Z., Al Zobayer, M. F., Akram, W., Anti, F. T. Z., & Rahi, M. L. (2024). Effect of arsenic on the biological traits of the major carp, rohu (*Labeo rohita*). *Marine Reports, 3*(1), 32–47.

Lowry, O. H., Rosebrough, N. J., Farr, A. L., & Randall, R. J. (1951). Protein measurement with the Folin phenol

reagent. *Journal of Biological Chemistry, 193*(1), 265–275.

Naylor, R. L., Hardy, R. W., & Buschmann, A. H. (2021). A 20-year retrospective review of global aquaculture. *Nature, 591*(7851), 551–563. http://dx.doi.org/10.1038/s41586-021-03308-6.

Ramasamy, R., Ramasubburayan, S., Prakash, S., Immanuel, G., Mubarak Ali, D., Rajakumar, G., Thirumurugan, D., & Palavesam, A. (2025). The transformative role of prebiotics, probiotics, and microbiomes in biofloc systems for sustainable aquaculture: A comprehensive review. *Reviews in Aquaculture, 17*(1), e13000. http://dx.doi.org/10.1111/raq.13000.

Tidme, A., Kakulte, V., Shaikh, Y., Tidame, S., & Gangurde. (2021). An assessment of the biochemical composition of some fishes. *International Journal of Fisheries and Aquatic Studies, 9*(6), 07–12.

Rodríguez-González, H., Hernández Llamas, A., Villarreal, H., Saucedo, P. E., García-Ulloa, M., & Rodríguez-Jaramillo, C. (2006). Gonadal development and biochemical composition of female crayfish *Cherax quadricarinatus* (Decapoda: Parastacidae) in relation to the gonadosomatic index at first maturation. *Aquaculture, 254*(1-4), 637–645. http://dx.doi.org/10.1016/j.aquaculture.2005.10.020.

Sathiamoorthi, M., & Palavesam, A. (2024). Effect of temperature on growth and proximate composition of *Labeo rohita* (L.). *Uttar Pradesh Journal of Zoology, 45*(18), 220–227. http://dx.doi.org/10.56557/UPJOZ/2024/v45i184440.