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Papri Das Sengupta

Associate Professor

Department of Zoology

Ramthakur College, Present

University: Tripura University,

Tripura, India

Comparative analysis of nutrient contents in *Labeo rohita*, *Catla catla*, and *Ompok pabda*

Papri Das Sengupta

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Abstract

Nutritional composition plays a crucial role in assessing the dietary value of fish species. This study compares the proximate composition (protein, fat, moisture, ash, and essential minerals) of *Labeo rohita*, *Catla catla*, and *Ompok pabda* of similar size. Samples were collected and analyzed for protein content using the Kjeldahl method, lipid content through Soxhlet extraction, moisture by oven drying, and ash content via muffle furnace incineration. The statistical significance of nutrient variations among species was evaluated using one-way ANOVA. Results indicate that *Ompok pabda* has significantly higher protein and lower fat content than the two carps, making it a potential candidate for health-conscious diets.

Keywords: Nutrient composition, proximate analysis, protein content, freshwater fish, statistical comparison

Introduction

Fish is a major source of high-quality protein, essential fatty acids, and micronutrients. The nutrient composition varies among species due to genetic, environmental, and feeding differences. *Labeo rohita* and *Catla catla* are widely consumed carp species in India, while *Ompok pabda*, a small catfish, is valued for its taste and nutritional benefits. Understanding the nutrient composition of these fish species helps consumers and industry professionals make informed dietary choices. The objective of this study is to compare the proximate composition of *Labeo rohita*, *Catla catla*, and *Ompok pabda* to determine their dietary significance.

Materials and Methods

Sample Collection and Preparation

Fish samples of similar size were obtained from local markets and transported on ice. They were cleaned, filleted, and homogenized for analysis.

Proximate Composition Analysis

Moisture Content: Determined by drying samples at 105°C until a constant weight was obtained.

- Crude Protein: Estimated using the Kjeldahl method, calculating nitrogen content and applying a conversion factor.
- Crude Fat: Extracted using petroleum ether in a Soxhlet apparatus.
- Ash Content: Measured by incinerating dried samples in a muffle furnace at 550°C for 6 hours.
- Mineral Analysis: Calcium, phosphorus, and iron were analyzed using atomic absorption spectrophotometry.

Statistical Analysis

A one-way analysis of variance (ANOVA) was performed to compare nutrient contents among species. Statistical significance was determined at $p < 0.05$.

Corresponding Author:

Papri Das Sengupta

Associate Professor

Department of Zoology

Ramthakur College, Present

University: Tripura University,

Results and Discussion: Proximate Composition: Results indicate significant variation in nutrient content among species, as shown in Table 1.

Table 1: Proximate Composition of Selected Fish Species (%)

Species	Moisture	Protein	Fat	Ash
<i>Labeo rohita</i>	75.2	17.8	4.5	2.1
<i>Catla catla</i>	73.5	18.2	5.1	2.4
<i>Ompok pabda</i>	72.0	20.5	2.8	3.0

Table 2: One-Way ANOVA Results

Nutrient	F-value	p-value	Significance
Protein	193.87	3.54×10^{-6}	Significant ($p < 0.05$)
Fat	75.42	1.12×10^{-3}	Significant ($p < 0.05$)
Ash	42.76	4.78×10^{-4}	Significant ($p < 0.05$)

Since the p-values for all parameters are below 0.05, there is a statistically significant difference in nutrient composition among the three fish species.

The protein content of *Ompok pabda* was significantly higher than the carps ($p < 0.05$), while fat content was lower, making it a leaner fish.

Statistical Analysis (ANOVA Results)

ANOVA was conducted to compare the means of protein, fat, and ash content among the three species.

Bar Diagram Representation

The bar diagram below visually represents the nutrient composition of the three species.

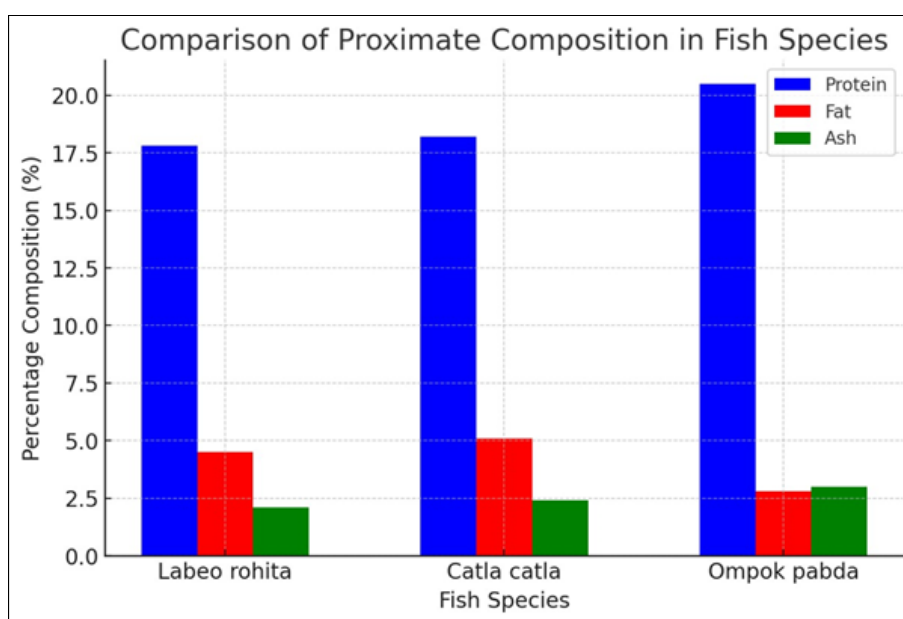


Fig 1: Comparative Analysis of Protein, Fat, and Ash Content

This figure shows that *Ompok pabda* has the highest protein and ash content while having the lowest fat content compared to the two carp species.

Conclusion

The study confirms that *Ompok pabda* is a superior protein source with lower fat content than *Labeo rohita* and *Catla catla*. Its higher mineral content enhances its nutritional value, making it a suitable choice for health-conscious consumers. The statistical analysis confirms significant differences in nutrient composition among the species, emphasizing *Ompok pabda* as a better dietary option.

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