Eco. Env. & Cons. 30 (1) : 2024; pp. (419-423)
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ISSN 0971–765X

DOI No.: http://doi.org/10.53550/EEC.2024.v30i01.076

Assessment of proximate composition in *Aspidoparia morar*, a small indigenous fresh water fish from the Jammu region, J&K (UT), India

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(Received 17 November, 2023; Accepted 7 January, 2024)

ABSTRACT

The present study was conducted to find out the proximate composition in *Aspidoparia morar*, a nutrient rich small freshwater fish species from the Jammu region. The proximate composition which includes crude protein, crude lipid, moisture, ash and carbohydrate content was studied in this fish. The protein content in the studied fish was reported to be 15.28% and the lipid content was 3.6 %. Similarly, the ash and moisture content were found to be 1.75 % and 78.21 % respectively. The carbohydrate content in the fish was observed to be 1.16%. The gross energy value in the fish was reported to be 98.16 Kcal/100g. The findings of the present study revealed that small indigenous fishes like *Aspidoparia morar* are a good source of proteins. The current study will also offer useful data to the consumers on the nutritional composition of this fish, allowing them to make better fish choices based on nutrition.

Key words*: Proximate composition,* Aspidopariamorar, *Gross energy value, Carbohydrates, Small indigenous fish*

Introduction

Fish being the third largest food commodity after vegetables and rice is consumed as a favourite dish throughout the globe. It is known to provide a rich amount of proteins and essential micro and macro-nutrients which play an important role in healthy body maintenance (Debnath, *et al*., 2014). Due to its high palatability, low cholesterol level, and tenderness of its flesh, fish has become popular in global cuisine (Eyo, 2001). Apart from being delicious and easily digested, fish meat lowers the risk of heart disease and enhances life expectancy. Fish flesh contains all of the required vital amino acids and contains 85 to 90% digestible fish protein (Debnath, *et al*., 2014).

Small indigenous fishes are usually those small freshwater fishes which can grow to a maximum length of 25-30 cm in their adult form (Mohanty *et al.*, 2013). These fishes constitute a larger group of the total finfish population due to their large abundance and number. Small indigenous fishes are nutrient-rich and are often ignored in developing nations. Earlier they were treated as 'trash fishes' and were often ignored but nowadays due to increasing awareness among people on the nutritional value of small fishes, they are admired worldwide (Debnath, *et al*., 2014). The fish tissues are comprised mainly of proteins, lipids, ash and moisture. The percentage of each component present in the fish's body constitutes the proximate composition.

Proximate composition is a very important parameter in determining the growth, nutrition and physiology of the fish (Copeland *et al*., 1999). The

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protein content of fish is of enormous nutritional significance to pregnant women for optimal foetal development and abortion prevention. It additionally enhances the overall mental and immune development of developing youngsters against certain diseases (NAFDAC, 2003).

From the public health point of view, it is highly important to have information on the proximate composition of the small indigenous fishes from Jammu which will help in understanding their nutritive significance and conditions. Till today, very little data on the nutritive significance of small fishes has been reported from the Jammu region. Keeping the nutritive significance of the small fishes in mind, a study has been conducted to examine the proximate composition of small indigenous freshwater fish, *Aspidoparia morar* belonging to the family Cyprinidae, abundantly found in the local water bodies of the Jammu region.

Materials and Methodology

Study area

The present study was conducted in the local water body of the Jammu region, i.e Chakrali Stream (30° 68'N latitude and 74° 80' E longitude) shown in Figure 1. The sampling was done during the month of February-March, 2022 using gill and Cast nets. For the proximate analysis, a total of 50 species of *Aspidoparia morar* with average length (9.87 cm) and average weight (8.29 g) respectively were taken (Table 1).

Sample preparation

After the collection, species were taken to the fisheries Lab in an insulated ice box for processing. The species were washed under the tap water to remove the dirt and blood. After washing, their average length and weight were measured. The species were beheaded, eviscerated, pooled and finally homogenised to obtain the mince which was then used for the proximate analysis (Figure 2).

Fig. 2. (a) Fish stock (b) Washing of Fish under tap water (c) Measuring of Fish length (d) Cutting of fish from the ventral side

Proximate analysis

The proximate composition viz. crude protein, ash, crude lipids, moisture content and carbohydrate content of *A. morar* (Figure 3) was analyzed in triplicates.

Protein content

The protein content was estimated using the folinciocalteu Phenol method of Lowry *et al*., 1951).

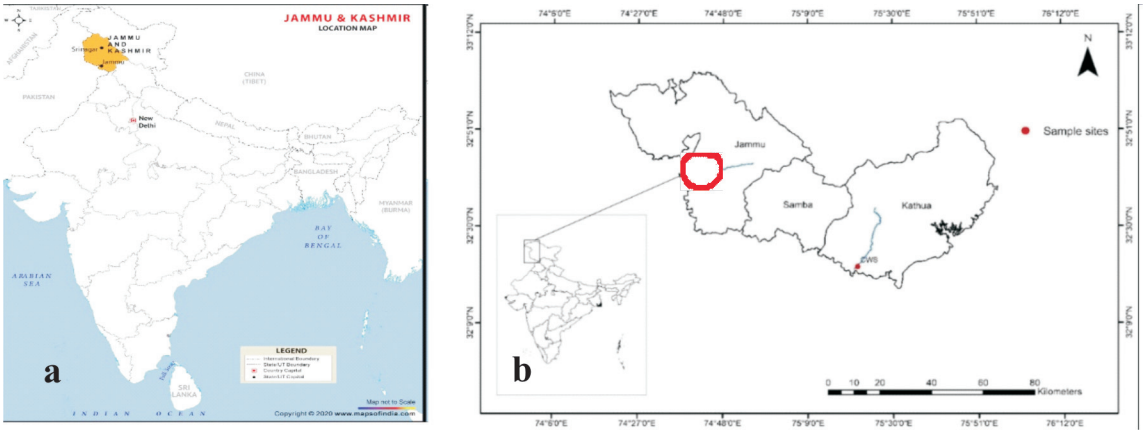

Fig. 1. (a) Map of India showing Jammu and Kashmir, (b) Map showing collection sites (encircled)

Table 1 Average length and Average weight of *Aspidoparia morar*

Fish Specie	Class	Order	Family	Collection Site	Total Length (cm)	Total Weight (g)
Aspidoparia morar	Actinopterygii	Cypriniformes	Cyprinidae	Chakrali stream	9.87 ± 0.73	8.29 ± 1.67

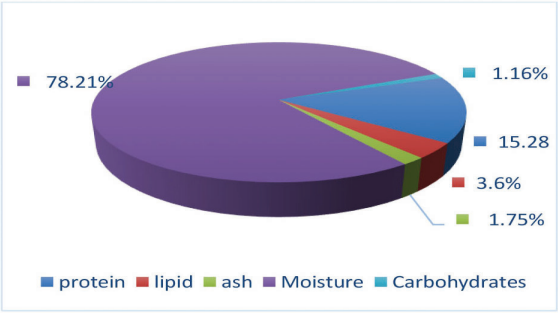

Fig. 3. Proximate composition of *Aspidoparia morar*

Moisture content

The value of moisture content was determined using AOAC, (1995). Moisture content was calculated by taking 5gm of sample in an aluminium dish and drying it in the oven at 105 °C for 18 hrs until constant weight was obtained. The following equation gives the moisture content:

Moisture (%) = (weight loss/weight of the sample taken) × 100

Lipid content

Crude lipid content was estimated using Folch *et al*., 1957, chloroform: methanol (2:1) solvent system.

Ash content

Ash content was estimated using AOAC,1995. For the ash analysis, about 2 g of fish muscle was taken in a silica crucible and placed in a muffle furnace (Jannat Biosystems, Pvt. Ltd.) for 4-5 hrs at 600 °C. The results were calculated using the equation:

Ash content (%) = (weight of the ash/ sample weight) ×100

Determination of Total Carbohydrates

The equation of Siddique *et al.*, 2012 was used for calculating the total carbohydrates in the fish sample. Total carbohydrate content was measured by subtracting the sum of a fat percent (F), ash percent (A), moisture percent (M) and crude protein percent (CP) from 100.

Percent total carbohydrate content = 100 - (CP + F+ M +A)

Determination of Gross energy value (caloric value)

The equation of Jabeen and Chaudhary, 2011, was used to determine the gross energy value of the fish. It was calculated by multiplying the percent crude fat (F), crude protein (CP), and total carbohydrates (C) content with their respective energy values of 9, 4, and 4 Kcal per 100 g of sample.

Caloric/gross energy value = (4CP + 9F +4C) Kcal/100g weight.

Statistical analysis

Statistical analysis was carried out using MS Excel 2019 and all the data were presented in mean ± standard deviation.

Table 2. Proximate composition of *Aspidoparia morar*

Components	Content (g/100 g of wet sample)
Crude protein	15.28 ± 0.07
Crude lipid	3.6 ± 0.06
Ash	1.75 ± 0.01
Moisture	78.21 ± 0.09
Total Carbohydrates	1.16 ± 0.02
Gross energy (Kcal/100g)	98.16 ± 0.01

Values are represented as mean ± standard deviation of three replicates.

Results and Discussion

Proximate composition

In the present study, protein, lipid, ash, moisture, carbohydrates and gross energy values were found to be 15.28 ± 0.07 %, 3.6 ± 0.06 %, 1.75 ± 0.01 %, 78.21 ± 0.09 %, 1.16 ± 0.02 % and 98.16 ± 0.01 kcal/100 g respectively depicted in Table 2. Table 1 represents the average length and average weight of *Aspidoparia morar*.

Crude lipid content of *A.morar* was found similar to that of other SIFs such as *Gadusiachapra* (3.8%), *Pseudambassisranga* (3.8%), *Osteobramacotiocotio* (3.8%), *Puntius ticto*(3.4%), *and higher than that of*

Chela cachius (2.4%), *Esomusdanricus* (3.2%), *Mastacembelusarmatus* (1.7%), *Clarias batrachus* (1.3%), *Nandus nandus* (1.7%), *Heteropneustes fossilis* (1.9%), *Channa punctatus* (0.6%) and some indigenous major carps such as *Catla catla* (0.7%), *Cirrhinus mrigala* (1.1%), *Labeo rohita* (3%) (Bogard *et al*., 2015). Moreover, some SIFs such as *Mystus cavasius* (5.1%), *P. sophore* (7.2%), *A.coila* (12.6%), *Anabas testudineus* (12.8%), *A. mola* (4.5%), *Botiadario* (10.6%), *Mystus vittatus* (4.6%) (Bogard *et al.* 2015) have higher fat content than *A. morar.* Figure 3 depictsthe proximate composition of *Aspidoparia morar.*

Moisture content reported in this SIF was higher than many other small indigenous fishes such as *Mastacembelus armatus* (75.12%), *Colisa fasciata* (73.18%), *Chanda nama* (75.19%), *Notopterus notopterus* (76.59%), *P. sophore* (72.65%), *Anabas testudineus* (72.95%), *Heteropneus tesfossilis* (76.21%), *P. ticto* (72.84%) but almost similar to that of *Notopterus chitala* (78.11%), *Channa punctatus* (79.71%), *Channa striatus* (79.22%), *Clarias batrachus* (79.03%) (Jana *et al*., 2018). However, Protein content in this SIF was found similar to that of other SIFs such as *P.chola* (15.27%), *Ompakbimaculatus* (1 5.59%), *Clarias batrachus* (15.79%), *Heteropneus tesfossilis* (14.59%) (Lin *et al*., 2020). Moreover, the ash content of this fish was comparable to the three local Malaysian *Channa* species *C. striatus* (1.8%), *C.micropellets* (1.0%), *C. Lucius* (1.2%) (Zuraini *et al*., 2006), and some SIFs such as *Semiplotus semiplotus* (1.21%), *Macrognathusaral* (2.61%) and *A. morar* (2.36%) (Hossain, 2010).

Further, the carbohydrate content of this fish was lower than *P. ticto* (4.29%) but show similarities with other SIFs such as *Mastacembelus armatus* (1.82%), *Notopterus notopterus* (1.68%), *Mastacembelus panniculus* (1.13%), *Clarias batrachus* (1.34%), *Channa punctatus* (1.07%), *Channa striatus* (1.18%) (Jana *et al*., 2018). On the other hand, the gross energy value studied in this fish was found higher than other SIFs such as *Notopterus notopterus* (71 kcal/100g), *P. Chola* (91 kcal/100g), *Osteobramabelangeri* (85kcal/100g), *Clarias batrachus* (72kcal/100g), *Heteropneustes fossilis* (66kcal/100g), *Glossogobiusgiuris* (73kcal/100g) and *Channa punctatus* (77kcal/100g) (Lin *et al*., 2020).

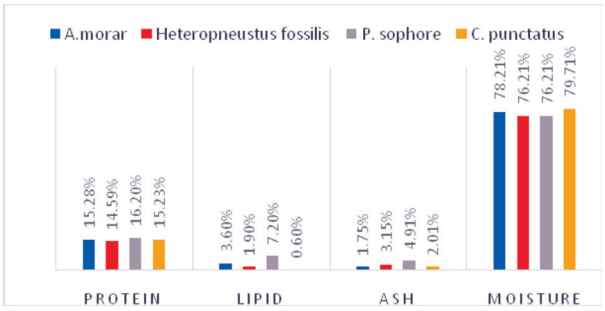

Fig. 4. Comparison in the Proximate composition of *Aspidoparia morar* with other small indigenous fishes (*Heteropneustusfossilis, Puntius sophore and Channa punctatus*)

Conclusion

Small indigenous fishes like the Indian minor carp and other large fishes are no exception and contain an abundance of vitamins and minerals especially calcium, potassium, and phosphorus as they are consumed whole along with their bones and therefore can play an important role in dealing with various nutritional insufficiencies. The higher protein contents in SIS make them a significant dietary supplement for promoting growth and tissue healing, and they may be able to minimize animal protein requirements for the growing human population. Overall, the results on the nutrient profile of *Aspidoparia morar* showed it is an incredible source of quality proteins, carbohydrates, lipids, ash and gross energy. These findings suggest that *A. morar* can act as a powerful natural supplement constituting a healthy human diet and its daily incorporation in the human diet could have various positive health benefits resulting in the betterment of the nation's health where the majority of the population is suffering from hunger, undernutrition, and malnutrition. Moreover, the outcome of this study will also make consumers locally and globally aware of its nutritional significance and thus helping them make better nutritional choices.

Acknowledgement

The authors would like to acknowledge the Head of the Department of Zoology, Jammu University, SAP (Special Assistance Programme), PURSE (Promotion of University Research and Scientific Excellence), RUSA 2.0 (Rashtriya Uchchatar Shiksha Abhiyan), and UGC (University Grant Commission) for this work.

Conflict of Interest

The authors declare that they have no conflicts of interest

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