



VARIATION OF PROTEIN CONTENT WITH SIZE IN THREE FRESH WATER FISHES (MOUROLA, BATA AND PUNTI) CONSUMED IN WEST BENGAL

Zoology

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ABSTRACT

Present paper deals with estimation of proteins from three different species of small indigenous fresh water fishes viz. Mourola (*Amblypharyngodon* sp.), Bata (*Labeo bata*) and Punti (*Puntius* sp.) largely consumed in West Bengal and study of the variation in the protein content with the size of the fishes. The protein content was highest in *Puntius* sp. followed by *Labeo bata* and *Amblypharyngodon* sp. In general the protein content per gram of body weight was found to be higher in smaller sized fishes except for Mourola where the protein content increased with size.

KEYWORDS

Fresh water fishes, protein content

INTRODUCTION

Protein, which occurs in almost everything found in a cell is one of the four major basic building blocks. This biomolecule shows a range of functional heterogeneity, like enzymatic activity, cell signaling, maintaining cellular rigidity and integrity to name a few. This accounts for its preeminent and vital role in the growth and maintenance of most organisms including humans. Therefore, it is essential to include proteins in our diet in order to ensure the normal functioning of the body, as its inadequacy leads to reduced growth and hampers various metabolic processes important for homeostasis. Being such an essential constituent of human diet, it is imperative to know the protein content of various foods that are included in our daily diet, one of which is fish. Fishes constitute a predominant source of animal dietary protein. The small indigenous fishes, owing to their easy availability and abundance are a rich source of proteins, vitamins and minerals (like calcium and phosphorus). In a country where a large chunk of the population suffers from malnutrition, consumption of these fishes can be effective to combat the problem.

Small indigenous fishes are valuable fishery resources as well as important to biodiversity of fish fauna. There is general observation that biodiversity of fish species in West Bengal has been declining during the past few decades (Ghosh et. al., 2018). West Bengal is enriched with 6.08 lakh hectare of freshwater fisheries resources in the form of Ponds and Tanks (2.88 lakh hectare), Beels and Boar (0.41 lakh hectare), Reservoirs (0.27 lakh hectare), 22 river drainage basins (1.72 lakh hectare) and Canals (0.80 lakh hectare) [Government of West Bengal, 2016]. Basins of river Ganga (81% of area), river Brahmaputra

(12%), river Subarnarekha (4%) and two small coastal rivers (3%) provide an important domain for freshwater fish biodiversity in West Bengal (Bandyopadhyay et al. 2014)

Three species of small freshwater fishes Mourola (*Amblypharyngodon* sp.), Bata (*Labeo bata*) and Punti (*Puntius* sp.) were selected for the present investigation. The aim was to look into the nutritional value of these small indigenous fishes, which, as of now, does find a place in the diet of most people but not as much as large fishes which dominate the diet of most people, particularly in cities. Several species of fresh water fish are now rarely available and the main causes of the decline of these native fish species are habitat loss and species introductions. Due to lack of scientific data and perception about the criteria to be used for the characterization, the conservation of the freshwater fishes and designating conservation status of threatened fishes has never been adequately addressed to in India (Mogalekar, et. al., 2017). Punti [*Puntius sophore* (Hamilton, 1822)] is of least concern according to IUCN status and the status of Punti Barb [*Puntius puntio* (Hamilton, 1822)] has not yet been evaluated. Mourola [*Amblypharyngodon mola* (Hamilton, 1822)] used as food is also of least concern. Bata [*Labeo bata* (Hamilton, 1822)] used as food and *Labeo boga* (Hamilton, 1822) used as food and an ornamental fish are also of least concern (Mogalekar, et. al., 2017). Thus the three selected species are easily available in the local markets.

MATERIALS AND METHODS

Fish of different sizes of the three species were collected from the local markets. The fish were identified with the help of available literature and expertise.

Protein extraction

Proteins were extracted from fish muscle in 0.2 M Tris HCl buffer (pH 7.4) by using a homogenizer. The extract was clarified by centrifugation at 12000×g for 5 minutes at 4°C. The supernatant was collected. The samples were then stored at -20°C.

Estimation of proteins

The protein concentration in the extract was estimated by the modified method of Lowry (Lowry et al., 1951). The absorbance was recorded at 660 nm using UV Spectrophotometer. A calibrated solution of bovine serum albumin was used as a standard and a standard curve was plotted with absorbance (optical density or OD) on Y-axis and concentration of BSA solution on the X-axis and the amount of protein in the unknown sample was estimated from the standard curve.

RESULTS AND DISCUSSION

Detailed general information on the fishes

1. Amblypharyngodon sp.

- Commonly known as mourala, it is another freshwater fish of the family Cyprinidae found in India, Bangladesh and Myanmar.
- It is a natural inhabitant of ponds, canals, slow moving streams, beels.
- It reaches a length of 6-8 centimeters.
- It is a surface feeder. Unicellular and filamentous algae, protozoans and rotifers are the preferred food types for this fish.
- Available in the local markets and declared as a fish of least concern by IUCN.

Labeo bata

- A genus of freshwater, benthopelagic, potamodromous fish belonging to the family Cyprinidae and Subfamily Labeoninae. It is commonly known as bata fish.
- Tropical in distribution it is a native fish to India and found throughout India (West Bengal, Orissa, Tripura).
- Ponds, rivers, rivulets are its main habitats.
- The adults grow to a maximum length of 25-35 centimeters.

- Its food comprises crustaceans and insect larvae in early stages. It feeds on algae and small fishes so omnivorous in diet.
- It is well known fish in the markets of West Bengal due to its taste and also commercial fish in aquaculture.
- It is declared as a fish of least concern by IUCN in India.

2. Puntius sp.

- A genus of small freshwater fish in the family Cyprinidae, native to South Asia and Mainland South East Asia. It natively inhabits streams, rivers, canals and ponds.
- They live in a tropical climate in water with a 6.0-6.5 pH and feed on worms, insects and plant matter.
- They grow up to a length of not more than 10-15 centimeters.
- These fishes are of commercial importance in fisheries and aquarium trade and are easily available in the local markets of West Bengal, where, they are consumed.
- Declared as a fish of least concern by IUCN.

Protein content

The protein content was found to be highest in *Puntius* sp. followed by *Labeo bata* and *Amblypharyngodon* sp. (Table 3). ***Puntius* is a genus of small freshwater fish in the family Cyprinidae. Its size ranged from 5.2-6.5 cm in the fishes available in the local markets (Table 2). It is largely an herbivore feeding on algae and higher plants (Table 1). It has also been found to feed on protozoa, insects, diatoms, crustaceans, rotifers, fish remains, etc. (Mookerjee et al., 1946). It is a very plentiful shoaling fish. The protein content was found to higher in the smaller sized fish except for *Amblypharyngodon* sp. where the protein content increased with the size of the fish. *Amblypharyngodon* sp. also belonging to the family Cyprinidae is a surface feeder and feed on unicellular algae, protozoa, rotifers and crustaceans (Bhuiyan, 1964). This fish is largely available in the local markets with the size ranging from 5.3 – 7.1 cm. *Labeo bata* another Cyprinidae is a largely consumed fish in West Bengal. Its food comprises crustaceous and insect larvae in early stages (Mookerjee et al., 1946). The size ranged from 14-16.4 cm.**

Table 1: Habit, habitat and availability of the selected fresh water fishes

Name of the fish	Habitat	Food Habit	Availability
Mourala <i>Amblypharyngodon</i> sp.	Available in the rivers, streams, beels, canals, ponds	Probably feeds on small invertebrates, zooplankton and algae	Found in large number in India with different species
Bata <i>Labeo bata</i>	Ponds, river, rivulets	Mainly consume protozoa, algae, insects and tiny fishes	This species is largely found in north-east India
Punti <i>Puntius</i> sp.	Present in the lowland watery area, in small ditches, wetlands, ponds	Omnivorous; diet includes small invertebrates and plant matter	Found in large number in India with different species

Table 2: Size and weight of the selected freshwater fishes

Name of the fish	Size (in cm)	Weight (in gm)
Mourala <i>Amblypharyngodon</i> sp.	Small	± 5.3
	Medium	± 6.3
	Large	± 7.1
Bata <i>Labeo bata</i>	Small	± 14.0

Punti <i>Puntius</i> sp.	Medium	± 16.4	± 38.9
	Large	-	-
	Small	± 5.2	± 2.23
	Medium	± 5.5	± 2.41
	Large	± 6.5	± 4.00

Table 3: Soluble muscle protein concentration of the selected freshwater fishes

Name of the fish	Size in cm	Weight of fish in gms	Protein Concentration (mg/gm of muscle)	Size in cm	Weight of fish in gms	Protein Concentration (mg/gm of muscle)
Mourala	5.3	1.23	4.64	7.1	3.97	7.68
Bata	14.0	21.76	13.28	16.4	38.9	12.32
Punti	5.2	2.23	16	6.5	4.0	5.92

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