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## RESEARCH ARTICLE

### VARIATION IN TOTAL PROTEIN CONTENT OF FRESHWATER TELEOST *Schizothorax plagiostomus*

\*Snober Shah, Ulfat Jan, G. Mustafa. Shah, and Rehana nabi

<sup>1</sup>Department of Zoology, University of Kashmir, Srinagar, Jammu and Kashmir\_ 190006, India

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#### ABSTRACT

The main aim of the present study was to validate the nutritive value of economically important fish *Schizothorax plagiostomus* of Kashmir valley. *Schizothorax plagiostomus* (Khont) Heckel, 1838, locally available teleost of Kashmir valley were sampled from March 2012 to February 2013 to analyze the seasonal and monthly variation in the total protein content of muscle tissue. Results show that the nutritive value of a species of fish varies throughout the year. Marked fluctuations in protein content of the fish have been analyzed during the study period. Highest protein values in muscles of *Schizothorax plagiostomus* were recorded in July and lowest was observed in the December. In conclusion, it was seen that protein content in the muscle of *Schizothorax plagiostomus* was significantly influenced by the season, spawning, availability of food etc.

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#### INTRODUCTION

The state of Jammu and Kashmir is rich in natural freshwater lakes and rivers all of which contain some kind of fish. Fish are quite different from the other animal food sources, because they provide low energy and have high-level proteins, which contain all essential amino acids. So they are beneficial nutrition source (Weathery and Gill 1998). The protein content of fishes ranges from 14 to 18g/100g raw edible parts (Darnton- Hill *et al.*, 1988). Scientists report that societies with high fish intake, such as the Inuit and the Japanese have considerably lower rates of acute myocardial infarctions, other ischemic heart diseases and atherosclerosis (Bang & Dyerberg, 1980; Blanchet *et al.*, 2000). Biochemical composition of the whole body indicates the nutritional quality of the fish.

The composition, however, varies greatly from species to species and also from individual to individual depending on age, sex, environment and season (Huss, 1988; 1995). The composition of species also appears to vary from one fishing ground to another, and from season to season. Despite the numerous cited studies on biochemical composition of the different groups of fishes have been carried out but no detailed biochemical studies of the lipid and protein contents of *Schizothorax plagiostomus* are available. *Schizothorax* is a prized indigenous herbivorous cold freshwater teleost of Kashmir valley whose population is at decline due to multiple factors. (Mir and Channa, 2010). The fish belonging to the family *cyprinidae* proves to be economically most valuable promising food species. The aim of the present study was to determine the best time of year in which fish have eminent nutritional components especially protein. Therefore investigation has been undertaken as an effort to evaluate both seasonal and monthly variation in the nutritional value *Schizothorax plagiostomus* locally known as 'Khont' during the fishing season.

#### MATERIALS AND METHODS

The present study was carried out in Department of Zoology University of Kashmir Hazratbal Srinagar Kashmir India. The seasons

chosen for analysis were summer, spring, autumn and winter. The samples were collected in the middle month of each season and 5-6 individuals were sampled in each month. Samples of *Schizothorax plagiostomus* were bought from their natural habitat, i.e., Jehlum River Srinagar Kashmir. Fishing was performed with the help of professional local fishermen. The fish samples were immediately transported to the laboratory where morph metric measurements by involving weight, length, and width of each of these fish were carried out. After morphometric measurements, each fish was dissected to collect muscle tissues. The study was conducted covering from March 2012 to February 2013. In order to determine the total protein composition, muscle tissue samples were weighed and homogenized in a hand homogenizer, before the analysis of biochemical components.

#### Protein Estimation

Total protein content of fish was estimated by Lowry *et al.*, 1951.

#### RESULTS

The percentages of body constituents varied with the variation of season, availability of food, reproductive period, storage and utilization of reserves.etc in the present study of *Schizothorax plagiostomus*. Many investigators have published analysis of body composition of fish (Love *et al*; 1980) but previously no studies on *Schizothorax plagiostomus* have been observed to determine the total protein content of muscle tissue in Kashmir valley. The proximate composition of protein in the experimental fish for four seasons is presented in Table. Fish generally contain good quantity of protein. Protein content of *Schizothorax plagiostomus* showed remarkable fluctuations and ranged from 0.0916g/g - 0.1566 g/g. There was decrease in protein content from March to May followed by increase in June, July. Slight decrease was observed from August to September and slight increase in the month of October. The percentage of protein in the muscle tissue was maximum in the month of July and lowest in the December. The studies showed that the amount of total protein in *Schizothorax plagiostomus* reached maximum level at the end of spawning and during nutrition season, but that amount diminished during reproduction season. The values

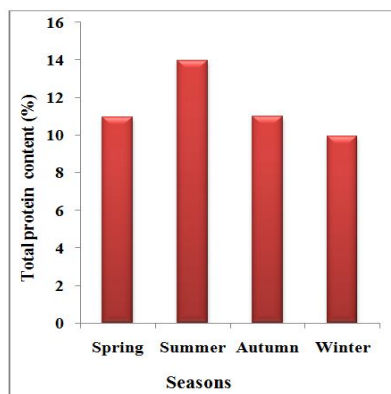
\*Corresponding author: snobersshah42@yahoo.com

of protein in different season samples of the fish indicate that they are rich source of concentrated protein to consumers.

**Table. Monthly variation in muscle protein content of *Schizothorax plagiostomus*. (gm/gram of tissue).**

Month	Species <i>S.plagiostomus</i> .
January	0.0962 ± 0.0006
February	0.1100 ± 0.0020
March	0.1182 ± 0.0019
April	0.1116 ± 0.0033
May	0.0990 ± 0.0066
June	0.1301 ± 0.0080
July	0.1566 ± 0.0064
August	0.1314 ± 0.0026
September	0.1084 ± 0.0025
October	0.1164 ± 0.0045
November	0.1044 ± 0.0031
December	0.0916 ± 0.0051

Data is expressed as mean ± SD of three separated determinations.



**Graph showing seasonal variation in muscle protein content of *Schizothorax plagiostomus***

## DISCUSSION

The variation in biochemical composition of muscles of fish species could be attributed to changes in activities in the fish species when related to variation in seasons. These activities include spawning, migration, availability of food and utilization of reserves etc. As some researchers explained, these variations have resulted from the biological features of species. In the life span of fish, the most important biological properties are reproduction and nutrition physiology (Atchison, 1975). Protein content can be correlated with the phases of maturity and spawning when the gonads are ripen and decline during post-spawning period (Parulekar and Bal, 1969; Das, 1978). Bhuyan *et al.*, 2003 reported Higher protein content were observed in ripe and gravid fish where a low level of protein was recorded in spent and young. Highest protein content was observed in the month of July i.e in summer season. In this season the temperature is changed and is favorable for different varieties of food to grow. At this stage there are no gonadal elements in fish because they are in recovery stage and fish consumes more food in comparison to other seasons. Due to absence of gonadal elements and uniform and maximum consumption of food varieties by fish maximum protein is estimated in this season. Our results are in agreement with Geri *et al.*; 1995 and Zafar, A and Ashraf, M. 2011). During autumn season the temperature and food availability changes and therefore fish feeds less and the protein content also declines. Also in this period gonadal development starts. As reproductive elements are energy demanding therefore the food that the fish eats is used for making gonads. Similar type of results was observed by (Ulfat *et al.*; 2012). Lowest content of protein was observed in December i.e winter. During winter the temperature is low and food availability is less therefore intake is significantly reduced and hence protein content is lowest. There is slight increase in food intake (February- March), after winter due to which the protein content also increases. In spring season, protein content is slightly raised as temperature and food availability changes. During pre-spawning stage the protein content is increased which

may due to its ready supply by liver (Van Bohemen and Lambert, 1980). With the commencement of spawning season feeding activity also decreased. There was a decrease in the muscle protein. These could be attributed to less food intake. Also during spawning period the gonadal elements gets released carrying the protein along with them and protein declines. The decrease in the protein values in the muscles may be due to fundamental nitrogen demands for maturation of gonad (Piska and Prasad 1991). Muscles showed low protein content in these months could be supported by the fact that for high gonadal activities. This nutrient demand is furnished by the leaching out of these nutrients from muscles to gonads. While in muscle tissues during the reproduction period, the decrease in the amount of total protein justifies our result. In conclusion the present study revealed seasonal changes in biochemical composition of the muscle associated with availability of food, spawning, temperature, storage and utilization of reserves.

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