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Research Paper

MONTHLY VARIATION OF BIOCHEMICAL COMPOSITION OF GONIA (*LABEO GONIUS*) COLLECTED FROM BANGLADESHI WATER

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Biochemical composition indicates the percentage of many important nutrients that are essential to the human body. The study was conducted to determine the chemical composition of *Labeo gonius* bio based on the moisture. Comparative analysis of several estimated parameter (using AOAC, 1990 method) suggest a definite monthly variation from the point of nutritional aspect of *Labeo gonius*. The highest value of crude protein and moisture was found in May, while lipids, carbohydrates, ash and crude fiber were in July and August, respectively. Crude fiber was absent in April, May and August, but present in a very high amount in July. Furthermore, the value of the fat suddenly increasing in a very high amount in July. Changes in the water and fat indicate that while obviously increased fat content, there was a decrease in the water content due to heavy feed during this period. In addition to the fat and protein content was lower in August may be due to the breeding season gonias.

Keywords: *Labeo gonius*, Protein, Seasonal variation

INTRODUCTION

Gonia, *Labeo gonius* (Hamilton) is a common species of minor carps under Cyprinidae family distributed in natural waters of Pakistan, India, Nepal and Myanmar (Talwar and Jhingran, 1991). In Bangladesh this fish is normally captured from the natural sources belonging to *haors*, *baors*, *beels*, rivers, etc. of Kishoreganj, Narsingdi and Noakhali districts and now being cultured in captive condition (DoF, 2012).

Moisture, protein, fat and ash as major components and carbohydrates, vitamins and minerals as minor components form the main constituents of fish body (Begum and Minar, 2012). Protein is considered as the main building block for the animal body. For human diet most of the portion comes from the fish and fisheries product (Minar *et al.*, 2012a). Fish protein is highly digestible compared with other protein sources. It consists of all the 10 essential amino acids in

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an amount desirable for human consumption. Fish protein is very rich in amino acid such as methionine, lysine and tryptophan low in comparison with mammalian protein (Begum *et al.*, 2012). Besides fishes is a rich source of essential nutrients required for supplementing both infant and adult diets (Minar *et al.*, 2012b; Azim *et al.*, 2012).

Among the 56 fresh water fish species in Bangladesh (Mahfuz *et al.*, 2012) *Labeo gonius* is one of them (DoF, 2012). Hence forth, few studies such as spawning habits and early stages in the development of *L. gonius* by Ahamed (1944), life history of gonias by Mookerjee and Ganguli (1949), length-weight relationship about mature female of *L. gonius* by Chondar (1972), biology of *L. gonius* by Permeshwaran *et al.* (1974), relative condition factor and length-weight relationship by Dars *et al.* (2010), age and growth by Chatterji (1992), seasonal variation of protein and amino acid at India by Deka *et al.* (2012a) and Impact of seasonal and habitat on the composition of gonias fish at India by Deka *et al.* (2012b) were determined in several countries except Bangladesh.

Therefore the present study was concentrated on *Labeo gonius*, an endangered fish species in Bangladesh to assess its nutritional composition with special reference to protein in four different months of the year.

MATERIALS AND METHODS

Sample Collection

A total number of 16 *L. gonius* samples were collected Chamtaghat area, Mymensingh Bangladesh (Figure 1 indicates the collection place of fish) during April to August. Then the samples were brought into the Laboratory of Fish

nutrition, Bangladesh Agricultural University, Mymensingh for biochemical composition

Figure 1: Collection Place of Fish



Preparation of the Sample for the Test

The sample was cut into very small pieces for testing various examinations. Determination of moisture content of the raw fish was conducted by AOAC method (AOAC, 1990). The crude protein of the fish was determined by Micro-Kjeldhal method (Pearson, 1999). The estimation of fat content of experimental raw fish had been accomplished by Bligh and Dryer method (Bligh and Dryer, 1999). The fresh raw samples (2/3 g) were minced, weighed and ignited in the crucible. Then it was transferred in the Muffle Furnace held at dark red at a rate of 550^o-600^o °C for 6-8 h until the residue was white. Finally the percentage of ash content was calculated.

Calculation of Moisture

$$\% \text{ of moisture} = \frac{\text{weight loss}}{\text{original weight of the sample taken}} \times 100$$

Calculation of Protein

The percentage of nitrogen in sample was calculated by the following formula-

$\% \text{ of } N_2 = (\text{Titration reading} - \text{blank reading}) \times \text{Strength of Acid} \times 100/5 \times 100/\text{weight of the sample}$. For most routine purpose the % of protein in the sample is calculated by multiplying the % of N_2 with an empirical factor 6.25 for the fish.

$$\% \text{ of the protein} = \% \text{ of total } N_2 \times 6.25$$

Calculation of Fat

$$\% \text{ of fat} = \frac{\text{weight of the residue}}{\text{Weight of the sample taken}} \times 100$$

Calculation of Ash

$$\% \text{ of Ash} = \frac{\text{weight of dry sample}}{\text{Original weight of the sample taken}} \times 100$$

Carbohydrate Content

There is no single method suitable for determining total carbohydrate in all tissues and, apart from the indirect infrared method mentioned earlier under protein, the methods are not straightforward. For these reasons it is common to estimate carbohydrate (c) by difference.

$$C (\%) = 100 - P - W - F - A$$

where P is percentage protein (Nitrogen \times 6.25), W is percentage water and F is percentage of fat and A is percentage of ash.

Data Analysis

The results obtained were analyzed statistically by performing ANOVA and Tukey's tests where there were significant differences. Significance level was set to an alpha level of 0.05 (Sokal and Rolf, 1974). Statistical significance is indicated with appropriate letters on the data tables.

RESULTS AND DISCUSSION

The amount of moisture, lipid, crude protein, ash, crude fibre and carbohydrate in different months are given in Table 1.

Seasonal Variation

The average value of moisture, lipid, crude protein, ash, lipid, crude fibre and Carbohydrate percentage (%) was 71.74, 5.23, 16.45, 5.52, 0.65, and 0.87 respectively. The highest value of moisture and crude protein was found in May, lipid, crude fibre and Carbohydrate was in July and ash

Table 1: This Table Shows The Significance in Variations in Fish Muscle of *Gonia* in Different Months

Month	Moisture (%)	Lipid (%)	Crude Protein (%)	Ash (%)	Crude fibre (%)	Carbohydrate (%)
April	72.67 ^b	4.73 ^b	17.21 ^b	5.21 ^c	nil ^b	0.18 ^c
May	72.84 ^a	3.92 ^d	17.23 ^a	5.87 ^b	nil ^b	0.14 ^d
July	69.06 ^d	8.28 ^a	15.85 ^c	3.83 ^d	0.65 ^a	2.33 ^a
August	72.42 ^c	4.02 ^c	15.54 ^d	7.19 ^a	nil ^b	0.83 ^b
Average	71.7475	5.2375	16.4575	5.525	0.65	0.87
Average° S.D	71.75°1.80	5.23°2.06	16.46°0.89	5.53°1.40	0.65	0.87°1.02
Average° S.E.M	71.75°0.90	5.23°1.03	16.46°1.03	5.53°0.70	0.65	0.87°0.51

Note: Values with different superscripts in a row are significantly different (one way ANOVA followed by Duncan test, $p < 0.05$)

in August respectively. Crude fibre was absent in April, May and August but present in a very high amount at July. In addition the value of fat suddenly increasing in a very high amount at the month of July. Changes in water and fat indicate that while fat content evidently increased, there was a decline in water content due to heavy feeding during this period, which is in good agreement with previously reported results by Huss (1988; 1995). Besides the fat and the protein content was lower in the month of August may be due to the breeding season of gonias.

Moisture Variation

Moisture content was significantly different ($p < 0.05$) from one month to another though in the same fish (Table 1). The maximum moisture content was higher in May but lower in July. Like other fishes it has the greater percentage of moisture and may vary according to size, sex, season of the year (Mahfuz *et al.*, 2012; Minar *et al.*, 2012b; Azim *et al.*, 2012; Begum and Minar, 2012).

Protein Variation

The protein percentage show significant variations ($p < 0.05$). The highest value of protein was found in May and lowest in August. Deka *et al.* (2012a) found highest amount of protein in muscle and liver tissue in pre-monsoon ($138.22^{\circ} 6.82$ and $148.41^{\circ} 8.96$) and the lowest was observed in retreating monsoon ($42.8^{\circ} 1.49$ and $52.40^{\circ} 1.41$) where the fishes were collected from the lotic habitat and similar result from the lentic habitat also. Besides he found a comparatively lower protein content throughout the season in case of lentic habitat. The present result showed that this fish has a good source of protein and helpful to mitigate the protein demand of the people.

Lipid Variation

Lipid content (moisture basis) varied significantly ($p < 0.05$) between species. The average value of lipid in gonias was 5.23 and it was higher when compared to some native fish such as *G. chapra*, *C. soborna*, *A. punctata*, *C. psendeutropius atherinoides* where the values of lipid was ranged from 4.55, 3.99, 4.5, 1.87 respectively (Begum and Minar, 2012). The highest fat percentage was July while the lowest was in May. Deka *et al.* (2012b) found highest amount of lipid ($301.00^{\circ} 2.73$ mg/g) in lotic habitat during retreating monsoon season at India. And more or less similar result was found in case of lentic habitat. The presents study depicts that the variation in the level of lipid may be due to season which in turn affect the fish diet. Increased amount of lipid was found in July. It may be noted that both the habitat condition along with the changes of season have a significant impact on the synthesis of fat in fish.

Ash Variation

Ash may be defined as the residue that lacks water and volatile constituents containing carbon dioxide, oxides of nitrogen, etc. The ash percentage was higher in July and lower in August when subjected to experiment. The average values was $5.53^{\circ} 1.40$ which is more than *Labeo bata* (Mahfuz *et al.*, 2012) and some other small fishes of Bangladesh such as *G. chapra*, *C. soborna*, *A. punctata*, *C. psendeutropius atherinoides*, *T. ilisha*, *M. rosenbergii*, *P. monodon* is 1.68, 1.54, 2.87, 1.92, 2.27, 2.68 and, 2.91 respectively (Begum *et al.*, 2012). But Chowdhury (1981) found the values of ash was very high and may be due to habitat, season, sex and size in fishes.

Crude Fibre and Carbohydrate Variation

Most remarkable result is the absence of Crude fibre in all months except July. Besides The percentage of Carbohydrate showed significant variation from one to another month of the year.

The present work has elucidated that the nutrient composition of this species might be a good source of protein. In addition the nutrient composition was found vary to the other authors for the same fish (Deka *et al.*, 2012). The proximate composition of a particular species often varies from one to another region. The main cause of change is may be due to amount and quality of food, sex, season, size, habitat along with its movement it makes (Deka *et al.*, 2012; Minar *et al.*, 2012a; Begum *et al.*, 2012; Begum and Minar, 2012). Besides some physiological reasons and change of environmental condition might greatly affect the proximate composition (Boran and Karacam, 2011).

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