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Length-Weight Relationship and Condition Factor (K_n) of Gobi, *Glossogobius giuris* (Hamilton) from "Atrai River" in the Northern Part of Bangladesh

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Abstract: Length-weight relationship and relative condition factor (K_n) of freshwater fish Bar-eyed Gobi: *Glossogobius giuris* (Hamilton) from the northern part of Bangladesh. They were studied from 627 specimens ranging from 5.6-23.8 cm in total length for 6 months from July 2003-December 2003. Length-weight relationship is shown by the following equations: Log w = -1.8419 + 2.768×log L (for males) and log w = -1.708 + 2.667×logL (for females). The relatives condition factor (K_n) was determined for either sex separately. Mean K_n for males and females was found to be 1.0555 and 1.00465, respectively. The length-weight relationship and relative condition factor shows that the growth of *G. giuris* is satisfactory in the population that freshwater fish of the "Atrai river" in Noagaon district.

Key words: *Glossogobius giuris*, Atrai river, condition factor, bar-eyed, Gobi, Bangladesh

INTRODUCTION

The freshwater fish Gobi, *G. giuris* (Hamilton) is locally known as Baila, Belia or Bela belongs to a family Gobiidae of order Perciformes. It commonly occurs estuarine areas and freshwater through out Bangladesh, the Punjab, Ceylon, India, Burma, Malaysia and Far East (Bhuiyan, 1964; Srivastava, 1968). The fishes are also available in freshwater ponds, swamps, rivers and estuaries of Bangladesh (Doha, 1974).

Bangladesh is endowed with vast water resources. Fish and fisheries are indispensable part in the life cycle and livelihood of this country and it is the part of our cultural heritage. About 12 million peoples directly or indirectly depends on fisheries of which 1.2 million people are dependent full time on fish and fishing activities (Haque, 1999).

Now-a-days the gobi are considered a delicacy and precious food in some countries like Italy, India, Burma, Nepal and France. Bangladesh have a wide variety of small fishes, which are rich in vitamins and nutritive. Among *Channa*, *Glossogobius*, *Tilapia*, even small sized prawns etc. are palatable but at the peak season these fishes along with other small fishes fail to fetch a satisfactory market price. Traditionally, Western Europe and Japan have been the main areas where there is a high demand for Gobi in Asia (Pillay, 1990).

The majority of Gobi fishes are small in size and hence, it does not constitute and important fishery in Bangladesh. The highest availability of this fish seen in the rainy season all over the country. Through distributed widely but it has failed to draw the attention of fishery biologists, presently there is no information, no available literatures reveal on any aspect of the biology of this species (Raj, 1916; Hora, 1935; Mookerjee, 1944; Mookerjee *et al*., 1946; Alikunhi *et al*., 1951; Bhowmich, 1965; Doha, 1974). Little attention has been paid to this fish in his country in the past. Bangladesh has a potential to culture the species and may export to earn much needed foreign currency. If the fishery of these species can be developed in Bangladesh a lot of foreign exchange may be earned through the export of this species in future. With this idea the present study has been initiated for the first time in Bangladesh. The result of the present study, have practical value and would be useful in future for the development of culture techniques of the species in ponds. This fish *G. giuris* is a suitable candidate for the artificial culture in future so knowledge of various aspects of biology is considered as per requisite.

MATERIALS AND METHODS

Fish samples were collected monthly during July, 2003-December, 2003 from the various fishermen of the Atrai river, District Noagaon. A total of 627 specimens of *G. giuris* (316 males and 311 females), ranging size from 6.8-23.8 cm males, 5.6-23.6 cm females in Total Length (TL) and weight of 2.81-89.62 g males, 2.01-128.5 g females were used for the analysis. Length of fishes was measured to the nearest cm and weight up to g by using a scale sensitive portable electronic balance (Model no. 0801580,

A and D CO. Ltd., Korea), respectively. The measured fishes were sexed by observing the gonads after dissecting the abdomen. The length-weight relation of the fish was calculated from the logarithmic formula:

$$\log w = \log a + b \times \log L$$

Ponderal index (K_n) was observed separately for males and females of different length groups. It was calculated for each 1 cm length interval. The smoothed mean weights w, for each length group has been completed from the log formula and LeCren's (1951) modified formula: $K_n = w/aL^n$ has been adapted for the calculation of the relative condition factor.

RESULTS

Length-weight relationship: The length-weight equations were computed, separately for males and females. The sample were divided into 1 cm length groups and described by formula:

$$w = aL^b$$

Where:

W = Weight
L = Length
a and b = Constant

This expression can be transformed logarithmically as suggested by LeCren (1951) to log w = loga + blogL.

When empirical values of length were plotted against their respective weight on an arithmatic scale. Smooth curves were obtained (Fig. 1). A plot of weight against length on double logarithmic paper, however yielded a straight line (Fig. 2a and b) as expected.

The regression coefficients, when calculated using the methods of least square for male and female *G. giuris*

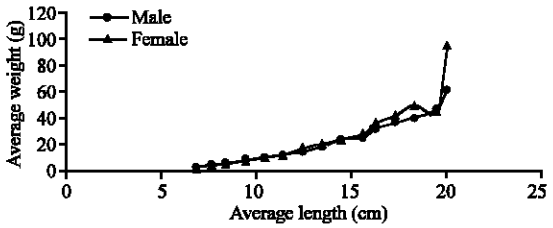

Fig. 1: Length-weight relationship of male and female of *G. giuris* from Atrai river, District Noagaon, Bangladesh (empirical values)

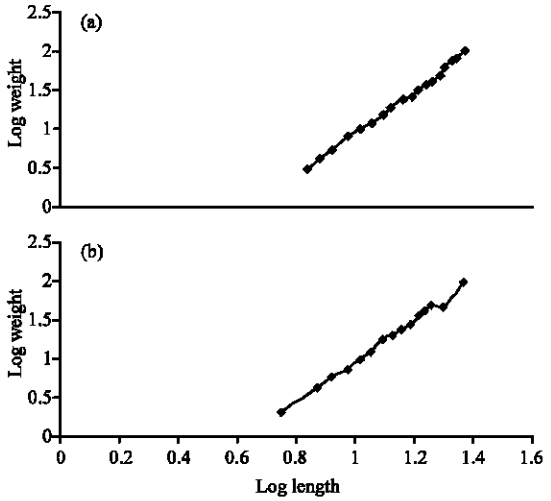

Fig. 2: Logarithmic length-weight relationship of *G. giuris* from Atrai river, District Noagaon, Bangladesh (2a for males and 2b for females)

Table 1: Mean relative condition factor (K_n) for different size groups of Gobi, *Glossogobius giuris* from Atrai river, District Noagaon, Bangladesh

Size group (cm)	Female				Male			
	No. species	Observe weight (g)	Calculated weight (g)	K_n	No. species	Observe weight (g)	Calculated weight (g)	K_n
5-6	1	2.01	1.936	1.041	-	*	-	-
6-7	-	-	-	-	2	2.97	2.902	1.023
7-8	7	4.226	4.197	1.015	8	4.098	3.912	1.047
8-9	14	5.766	5.602	1.029	16	5.238	5.013	1.045
9-10	32	7.226	7.852	0.92	32	8.06	7.02	1.148
10-11	44	9.818	10.1	0.972	38	9.635	9.285	1.038
11-12	25	12.054	12.834	0.939	50	11.653	11.821	0.986
12-13	52	17.659	16.108	1.096	42	14.985	14.955	1.002
13-14	34	19.688	19.971	0.986	30	18.49	17.764	1.041
14-15	20	23.896	23.863	1.001	23	23.623	22.318	1.058
15-16	40	27.434	28.514	0.962	18	25.565	27.861	0.918
16-17	19	36.241	34.282	1.057	21	31.422	33.733	0.932
17-18	10	41.688	38.525	1.082	14	35.937	37.344	0.962
18-19	7	49.98	45.47	1.099	9	40.221	43.774	0.919
19-20	-	-	-	-	4	47.102	51.312	0.918
20-21	3	45.587	58.135	0.784	2	61.2	55.731	1.698
21-22	-	-	-	-	3	73.49	67.01	1.097
22-23	-	-	-	-	2	79.155	74.655	1.06
23-24	3	95.335	87.725	1.0867	2	98.085	88.629	1.107

Average K_n males = 1.00465; Average K_n females = 1.0555; SD±0.08372; SD±0.17416; *No of male fish

in size range 6.8-23.8 cm for males and 5.6-23.6 cm for females gave the following equations:

$$\log w = -1.8419 + 2.768 \log L \text{ (males)}$$

$$\log w = -1.708 + 2.667 \log L \text{ (females)}$$

As may be seen from the equations, the exponential values for males and females were practically identical and closed to ideal value of b = 3. The agreement between the empirical weight and completed weight from regression can be termed as satisfactory.

Relative condition factor: The relative condition factor (K_n) was calculated by the formula of LeCren (1951). $K_n = w/aL^b$ this can be expressed as:

$$K_n = w/w_1$$

Where:

w = Observed weight

w_1 = Calculated weight as determined from the length-weight equations

The relative condition factor (K_n) for all fish samples was determined from the average lengths and weights of 1 cm interval of total size groups (Table 1). The (K_n) values ranged from 0.918-1.698 SD ±0.17416 with mean K_n = 1.0555 in males while, it ranges from 0.92-1.099 SD ±0.08372 with mean K_n = 1.00465 in females. Maximum relative values were observed in smaller sized fishes. The values of K_n shows fluctuation in all size groups of both males and females when t-test was applied on data of K_n for males and females was found that the values are statistically non-significant ($p>0.05$). On average, the males were in a slightly better conditions (i.e., mean K_n = 1.0555) than females (mean K_n = 1.00465).

DISCUSSION

The values of length-weight regression co-efficient b obtained for male (2.768) and female (2.667) in the present study. The t-test was conducted to see whether b values were different from the cube for male and female at 95% confidence limit. The values were significantly different from the cube for both sexes, variations workers have calculated values of regression co-efficient (b) in different fish species and found the value of b>3. Narejo *et al.* (1999) from Pakistan and Al-Baz and Grove (1995) from Kuwait have calculated value of regression co-effcient b in *Tenulosa ilisha* (3.0246 for males and 3.0345 for females) and (2.98 for males and 3.16 for females), respectively. Azadi and Naser (1996) showed the result of 3.16 for males and 3.20 for females in *Labeo bata*, Quddus (1993) reported values of regression co-efficient b = 3.40 in *Gudusia chapra* from Bangladesh. Hile (1936) and Martin (1949) observe that the value of regression co-efficient (b) usually lies between 2.5 and 4.0 in Cisco, *Leuchthys artedi*. Tesch (1968) reported that value of (b) might be in between 2.0 and 4.0. However, a variation in (b) value may occur due to species variation, difference in environmental factors, sex variation etc.

Shafi and Quddus (1974) and Quddus *et al.* (1984) reported the regression co-efficient of *Hilsa ilisha* in the range of 2.6-2.8. Mia (1984) reported regression co-efficient of *Heteropneustes fossilis* 2.61 for males and 2.80 for females. Narejo *et al.* (2000) reported the values of 2.96 (for males) and 2.62 (for females) *Gudusia chapra*. These value are significantly different from and similar to those obtained for *G. giuris* is the present study and also within the range as reported by Shafi and Quddus (1974), Quddus *et al.* (1984) and Mia (1984). The values of K_n show fluctuation in all size groups of males and females. The highest K_n values were found in smaller fishes, in agreement with Shafi and Quddus (1974) for *Catla catla* and *Cirrhinus mrigala*. The present investigation on length-weight relationship and relative condition factor of Gobi, *G. giuris* from Atrai river indicate that the growth rate is quite satisfactory in the region.

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