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SHORT NOTES **LIFE SCIENCE**

LENGTH-WEIGHT RELATIONSHIP AND CONDITION FACTOR OF CLIMBING PERCH (*ANABAS TESTUDINEUS*, BLOCH)

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Abstract: Length-weight relationship, condition factor and relative condition factor of climbing perch (*Anabas testudineus*, Bloch) were studied over a period of eleven months from April 2007 to February 2008. A total of 297 fish samples were collected from Khulna and Bagerhat districts. The length-weight relationship of *A. testudineus* was linear and the equations for total length-body weight and standard length-body weight were $BW = -35.77 + 5.65 \times TL$ (r^2=0.94) and $BW = -31.56 + 6.52 \times SL$ (r^2=0.94), respectively. The coefficient of correlation indicates that the relationship between length and weight of the fish was highly significant. The maximum and the minimum values of the condition factor were 24.594 (body weight 26.1 g) and 17.809 (body weight 18.9 g), respectively with the mean value of 20.522±1.248. The relative condition factor varied from 0.883 (body weight 12.7 g) to 1.225 (body weight 26.1g) with the mean value of 1.014±0.061.

Key words: Length-weight relationship, condition factor, climbing perch, *Anabas testudineus*

Climbing perch (*Anabas testudineus*, Bloch), locally known as *Koi*, is a highly palatable native fish, which occurs both in fresh and brackish waters in Bangladesh. It is famous for its ability to walk by its pectoral fins. It is found mostly in swamps, marshy lands, lakes, canals, pools, small pits and puddles (Talwar and Jhingran, 1991). It can tolerate extremely unfavorable water conditions and is associated mainly with submerged woods and shrubs (Pethiyagoda, 1991). *A. testudineus* has an accessory air breathing organ and can survive for several days or weeks out of water if the air breathing organ can be kept moist (Allen, 1991 and Rahman, 1989).

Among the various biological aspects of fish, the length-weight relationship is important in fishery management, culture regulations and also ascertaining the environmental suitability of a particular fish in a particular area (Quddus and Dewan, 1988). Application of length-weight relationship includes estimation of the standing stock biomass, calculating condition indices and comparing the ontogeny of fish populations from different regions (Petrakis and Stergiou, 1995).

Fortnightly samples of *A. testudineus* were collected during the period April 2007- February 2008 from Khulna and Bagerhat districts. A total of 297 specimens were collected using cast net and drag net from *ghers* and *beels*. On each sampling day 10 to 15 fish were randomly collected. The specimens were brought to the fish biology laboratory of Fisheries and Marine Resource Technology Discipline, Khulna University in fresh condition and preserved in a freeze at -18^{o}C.

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Total length (*TL*) of each fish was measured from the anterior most tip of the snout to the posterior most tip of the caudal fin on a meter scale to the nearest cm. Standard length (*SL*) was also measured from the anterior most tip of the snout to the base of the caudal fin on the same scale. Body weight (*BW*) was taken by an AND electronic balance with 0.1 g accuracy. Before taking weight excess water from the fish body was blotted dry.

The length-weight relationship was calculated by using Le Cren's (1951) formula as follows:

$$W = aL^b$$

Where, W = weight in g; L = length in cm; a = intercept and b = exponent.
The exponential form of the relationship in the formula was expressed in logarithmic form as follows:

$$\log W = \log a + b \log L$$

The values of a and b in the equation were calculated by using the following mathematical relationship given by Doha and Dewan (1967), Lagler (1956) and Rounsefell and Everhart (1953).

$$\log a = \frac{\sum \log W \times \sum (\log L)^2 - \sum \log L \times \sum (\log L \times \log W)}{N \times \sum (\log L)^2 - \left(\sum \log L\right)^2}$$

$$\text{and } b = \frac{\sum \log W - N \times \log a}{\sum \log L}$$

Where, W = weight in g; L = length in cm and N = sample size.
Statistical Products and Services Solutions (SPSS) software was used to calculate the correlation coefficient '*r*'.

The condition factor was calculated by using the following formula:

$$K = \frac{W \times 10^3}{L^3} \text{ (King, 1997)}$$

Where, W = weight in g; L = length in cm; K = condition factor and 10^3 = the factor bringing the ponderal index or condition factor near unity.

The relative condition factor (K_n) was estimated by using the following formula:

$$K_n = \frac{\text{Observed weight}}{\text{Calculated weight}}$$

The relationship between body weight-total length, log body weight-log total length, body weight-standard length and log body weight-log standard length are summarized in Table 1.

Table 1. Relationship between length and weight of *A. testudineus* (n=297).

Relationship	Regression coefficient (*b*)	Intercepts (*a*)	Correlation coefficient (*r*)	t-test at 5% sig.
Body weight-Total length	5.65	-35.77	0.97	67.394*
Log body weight-Log total length	2.88	-1.58	0.97	70.605*
Body weight-Standard length	6.52	-31.56	0.97	70.745*
Log body weight-Log standard length	2.66	-1.10	0.97	72.069*

*Significant

The lowest and the highest K values were observed as 17.809 and 24.594 with the *BW* 18.9 and 24.594 g, respectively. The mean value of K was observed as 20.522±1.248. The highest value of K was observed in the length class of 8.0-8.5 cm and the lowest in the length class of 11.5-12 cm. To eliminate the effect of length and other related factors K_n was calculated. The mean K_n was observed as 1.014±0.061 while the lowest and the highest K_n values were recorded as 0.883 and 1.225 having *BW* 12.7 and 26.1 g, respectively. Table 2 represents the mean K and K_n at different length classes of *A. testudineus*.

Table 2. Mean condition factor and relative condition factor at different length classes of *A. testudineus* (n=297).

Class size (cm)	Sample size	Mean total length (cm)	Mean body weight (g)	Log total length	Log body weight	Mean condition factor	Mean relative condition factor
8.0-8.5	15	8.14	11.38	0.915	1.056	21.051	1.021
8.5-9.0	52	8.78	14.01	0.943	1.146	20.736	1.014
9.0-9.5	77	9.16	15.64	0.961	1.194	20.306	0.998
9.5-10.0	63	9.70	18.96	0.987	1.278	20.779	1.029
10.0-10.5	44	10.15	21.55	1.006	1.333	20.597	1.025
10.5-11.0	18	10.74	25.53	1.031	1.407	20.600	1.032
11.0-11.5	20	11.11	27.49	1.045	1.439	19.999	1.006
11.5-12.0	8	11.56	29.23	1.063	1.466	18.913	0.956

In fish, the weight is considered to be the function of the length (Weatherley and Gill, 1987). Hile (1936) and Martin (1949) observed that the value of the regression coefficient '*b*' usually lies between 2.5 and 4.0 and an ideal fish maintain the shape at $b = 3$. The value of regression coefficient for combined sexes for *A. testudineus* was obtained to be 2.88 in the present study which is very close to 3.0 and therefore *A. testudineus* does follow the cube law which agree well with the findings of Shafi and Mustafa (1976).

A linear relationship observed between *TL* and *BW* indicated that weight of the fish was directly related with length. The logarithmic transformation of the *TL-BW* also produced the same relationship. The results obtained with present study agree well with the results reported for *Tenualosa ilisha* (Haldar and Amin, 2005), for *Pampus argenteus* (Rahman *et al*., 2004) and for *Catla catla* (Zafar *et al*., 2003). The logarithmic transformation of the *SL-BW* relationship was also positive and linear.

The *K* observed in the present study ranged from 17.809 to 24.594 with a mean value of 20.5±1.248. The highest value of the condition factor was observed in the smaller length classes. The variation might be associated with the smaller sample size or different stages of maturity or spawning variation or due to the weight of food contents in the stomach. Similar fluctuating trends of the condition factor were also reported in case of other fishes by Islam *et al*. (1999), Karim *et al*. (1988) and Mia (1984). The values of K_n were not stable to certain length classes. The highest K_n values were observed in the middle length classes which gradually decreased from left to right with the increase in length.

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