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Length-Weight Relationship and Condition Factor in Barilius Sacra of River Torsa in West Bengal

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ABSTRACT

The present study attempts to develop a comprehensive Length-Weight relationship and relative condition Factor (K_n) of *Barilius sacra* collected from River Torsa in West Bengal. The value of exponent 'n' in the equation $W = cL^n$ was found to be 2.47 for the species *Barilius sacra*. The computed 't' value indicated that the 'n' value of the species is not significantly different from the expected value '3' and hence the Cube Law $W = cL^n$ hold good in the case of *Barilius sacra*. The computed co-relation co-efficient (r) in *Barilius sacra* was 0.961 which is very closer to 1 indicating that there is high positive correlation between length and weight in the species. The relative Condition Factor (K_n) remained greater (1.16) than 1 for the species indicating their general well being to be good in Torsa river in West Bengal.

KEYWORDS: Length-weight relationship, Relative condition factor, *Barilius sacra*, Torsa River, West Bengal.

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INTRODUCTION

According to Le Cren, knowledge of the length-weight relationship of a fish is essential, since various important biological aspects, viz., general well being of fish, appearance of first maturity, onset of spawning etc., can be assessed with the help of condition factor, a derivative of this relationship, moreover, the length-weight relationship (LWR) of fish is an important fishery management tool because they allow the estimation of the average weight of the fish of a given length group by establishing a mathematical relationship between the two. As length and weight of fish are among the morphometric characters, they can be used for the purpose of taxonomy and ultimately in fish stock assessment¹. In fisheries Science, the condition factor is used in order to compare the 'condition', 'fatness' or well being of fish and it is based on the hypothesis that heavier fish of a given length are in better condition. Condition factor has also been used as an index of growth and feeding intensity. An extensive research on length-weight relationship of commercial freshwater fishes from different water bodies in India is already reported Das et. al.² Das et al.⁶. This study reports the LWR of *Barilius sacra* of Torsa River in West Bengal, India.

MATERIALS AND METHODS

In fishes, generally the growth pattern follows the cube law. Such relationship for the fishes will be valid when the fish grows isometrically. In such cases, the experimental value must be exactly 3. But, in reality, the actual relationship between length and weight may depart from the ideal value due to environmental conditions or condition of fish. This relationship is expressed by the equation $W = aL^n$. This equation was used by several workers for different fish species from different habitats.

In this study, a total 15 fish specimens comprises of *Barilius sacra* ranged from 53-97 mm in length and 1.82-7.23 gm in weight were studied for the length weight relationship. The species were identified by using the key provided by Jayaram⁷. Individual measurements of fish species pertaining to total length (TL cm) and total weight (g) were done with the help of precision Vernier Calliper and Digital Sartorius Electronic Balance respectively. The total length (TL) of each fish species were taken from the tip of snout to longest ray of caudal fin. Fish weight was measured after blot drying.

The LWR was established by fitting equation of the form

$$W = cL^n \quad \dots\dots\dots(1)$$

Where W is the weight of the fish, 'L' its length and 'c' and 'n' are constants. The equation 1 could be expressed in the linear form by using logarithms, as given below:

$$\mathbf{\text{Log } W = \text{Log } c + n \text{ Log } L}$$

The estimates of the constants c and n were obtained empirically by using the formulae, as given below:

$$\mathbf{\text{Log } c = \frac{\sum \text{Log } W \times (\sum \text{Log } L^2) - \sum \text{Log } L \times \sum (\text{Log } L \times \text{Log } W)}{N(\sum \text{Log } L^2) - (\sum (\text{Log } L))^2}$$

$$\mathbf{n = \frac{\sum \text{Log } W - N \text{Log } c}{\sum \text{og } L}}$$

Significance of the variation in estimates of n from the expected value 3 (cube law). Weights were estimated for different lengths using relationship equation. The relation between length and weight for each fish was computed with help of statistics. The Fulton's Condition Factor (K) was computed by using the formulae, as given below:

$$\mathbf{\text{Condition Factor (K)} = \frac{\text{Weight (g)}}{(\text{Length})^3 \text{ (cm)}} \times 100}$$

RESULTS AND DISCUSSION

The formula correlating L-W of *Barilius sacra* is given bellow:

$$\mathbf{\text{Log } W = -4.069 + 2.47 \text{ Log } L}$$

It is evident from the result that the 'n' value of length-weight relationship was found 2.47, represents fish that becomes less routed as length increases, indicating the allometric pattern of growth in the fish.

The computed correlation co-efficient (r) value in *Barilius sacra* was found to be 0.961 which indicates, there is high positive correlation between the length and weight in the species Das et al ⁶.

The Condition factor (K_n) is an indication of general well being of fishes. The Le Cren's condition factor (K_n) of *Barilius sacra* was found to be 1.16 which is greater than 1, Thus, indicating their general well being to be good. Therefore all these observations appear to indicate that single value of 'c' and 'n' may not be responsible for the entire size range of the fish.

The observed average weight of the species against the observed length with a predicted data, a parabolic curve has been obtained and a logarithmic graph prepared with the observed data of log L and log W with a predicted data showed a straight line relationship. The exponential value for *Barilius sacra* is the hypothetical value (3), 'n' value was 2.47 and the correlation co-efficient was 0.961. In length-weight relationship of *Barilius sacra*, weight increases with length. Thus, it is clear that these fishes maintain its shape throughout its life.

REFERNCES

1. Das BK, and Kar D. Habitat Mapping, Spatial Analysis to Fish Diversity of River Subansiri during Winter Season in Assam and Arunachal Pradesh (India). *Environment and Ecology*. 2011; 29 (4A): 1948-1951.
2. Das BK, Dutta B, Singh NgR and Kar D. Length-Weight Relationship of *Labeo calbasu* (Hamilton-Buchanan) from Sone Beel the Biggest Wetland of Assam, India. *PARIPEX-In. Journal of Research*. 2013; 2 (10): 11-13.
3. Das BK, Chakraborty A, and Kar D. Calculation of Length of a Fish Using Two-Dimensional Geometry. *International Journal of Scientific Research*. 2013; 2 (10): 48-51.
4. Das BK, Boruah P, and Kar D. Study of Seasonal Variation of Water Quality of River Siang in Arunachal Pradesh, India. *IOSR Journal of Environmental Science. Toxicology and Food Technology (IOSR-JESTFT)*. 2014; 8 (2IV): 11-20.
5. Das BK, Singh NgR, Dutta B and Kar D. Length Weight Relationship of *Labeo rohita* (Hamilton-Buchanan) and *Labeo gonius* (Hamilton-Buchanan) in Sone Beel the biggest Wetland of Assam, India. *Journal of environmental Research and Development*. 2014; 8 (3A): 587-593.
6. Jayaram KC. *The freshwater fishes of the Indian region*. Narendra Publishing House, Delhi, India. 1999; pp. 551.
7. Kar D. *Fundamentals of Limnology and Aquaculture Biotechnology*. Daya Publishing House, New Delhi, India. 2007; pp. xiv + 609.
8. Kar D. *Wetlands and Lakes of the World*. Springer (London). 2013; pp. xxx + 687.
9. Choudhury S and Dutta K. Interrelationship of Five Species of the Genus *Labeo* by Morphometric Analysis. *IOSR Journal of Pharmacy and Biological Sciences*. 2012; 2 (6): 35-39.
10. Kar D and Barbhuiya MH. Length-Weight Relationship and relative condition factor in Hilsa (*Tenulosa*) *ilisha* (Hamilton) of Barak Drainge in Assam. *Indian J. of Environ and Ecoplan*. 2005; (05): 265-267.

11. Ahmed EO, Ali ME and Aziz AA. Length-Weight Relationships and Condition factors of six fish species in Atbara River and Khashm el- Girba Reservoir, Sudan. *International Journal of Agriculture Sciences*. 2011; 3 (1): 65-70.
12. Simon KD and Mazlan AG. Length-Weight and Length-Length Relationships of Archer and Puffer Fish Species. *The Open Fish Science Journal*. 2008; (1): 19-22.
13. Oribhabor BJ, Ogbeibu AE and Udo MT. The Length-Weight Relationships of Brackish Water/Marine Fish Species Assemblage in a Niger Delta Mangrove Creek, Nigeria. *Current Research Journal of Biological Sciences*. 2011; 3 (6): 616-621.
14. Isa MM, Abdul Basri MN, Zawawi MZM, Yahyal K and Nor Md SA. Length-weight Relationships of Some Important Estuarine Fish Species from Merbok Estuary. Kedah. *Journal of Natural Sciences Research*. 2012; 2 (2): 8.
15. LeCren. The Length-Weight relationship and Seasonal cycle in Gonad Weight and condition in Perch. *Journal of Animal Ecology*. 1951; (20): 201-209.
16. Orhan AK, Kutlu S and Aydin I. Length Weight Relationship for 16 Species from the eastern Black Sea, Tirkkiye. *Turkish Journal of Fisheries and aquaculture Sciences*. 2009; (9): 125-125.
17. Sangun L, Akama E and Akar M. Weight-Length Relationships for 39 Fish Species from the North-Eastern Mediterranean Coast of Turkey. *Turkish Journal of Fisheries and Aquatic Sciences*. 2007; (7): 37-40.
18. Shadi A, Mediseh SD, Kouchanian P and Gandomi Y. Length-Weight Relationships for 6 Fish Species from Khuzestan (North of Persian Gulf), Iran. *World Journal of Fish and Marine Sciences*. 2011; 3 (2): 129-131.

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