



Research Note

Length-weight Relationship and Condition Factor of an Endemic Carp, *Osteobrama cunma* (Day, 1888) of Manipur

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Osteobrama cunma (Day) locally known as *Ngasheksha* in Manipuri is a minor carp endemic to the eastern part especially in the freshwater rivers and lakes of Manipur, India and Myanmar (Chindwin drainage system). It is one of the most important food fishes in Manipur. However, the population of this species has reduced drastically from the river *Imphal Turel* of Manipur and its tributaries. Hence, high priority must be given to study the biology of this species for conservation. *Osteobrama cunma* is closely related to *Osteobrama cotio* and *Osteobrama belangeri* in certain morphological characters. However, the species under study may be easily distinguished from the above species in having a combination of certain characters such as 48 scales on the lateral line; 9 scale rows between dorsal fin origin and the lateral line; 8 scale rows between lateral line and pelvic fin base; 20 pre-dorsal scale; 26 branched anal fin rays and 20 circumpenduncular scales.

Study of length-weight relationship has significance in fishery biology due to its several application like determining size of maturity and optimum size of capture (Le Cren, 1951). This relationship serves three purposes *viz.*, (i) to elucidate the mathematical relationship between the two variables so that if one variable is known the other could be computed, (ii) to determine the relative condition that can be used to assess the general wellbeing and type of growth, *viz.*, whether isometric or allometric growth and (iii)

to estimate the potential yield per recruit in the study of fish population dynamics (Prasad & Anvar, 2007). The study of length-weight relationship (LWR) of fish are important in fisheries biology and population dynamics as many stock assessment models require the use of LWR parameters and it is also one of the important morphometric characters for taxonomy (Goel et al., 2011).

Since there is no report on the biology of this endemic species, the present work was taken up to elucidate the length-weight relationship and relative condition in *Osteobrama cunma*. The condition factor was determined with the objective of expressing the condition of the fish in numerical terms *viz.*, degree of well-being, relative robustness and fatness (Bhattacharya & Banik, 2012).

Specimens for the present study were collected at monthly intervals from Thoubal river, a part of Chindwin river system in Manipur. The study was based on 120 specimens (70 female and 50 males) collected during September 2011 to August 2012. Total length of each specimen was measured from tip of the mouth to tip of the longest caudal fin lobe to the nearest mm and the body weight was recorded to the nearest g for males and females separately. The relationship was calculated by the method of least squares using the equation $\log W = \log a + b \log L$ where, W = Weight in gram, L = Total length in mm and 'a' and 'b' are constant forms of the formula $W = aL^b$ (Le Cren, 1951). The level of significance was tested by covariance method (Snedcor & Cochran, 1967). Student's t-test was performed to test the significance of regression co-efficient to find out whether the length-weight relationship follows the isometric pattern. Condition factor or Ponderal

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index was determined, using the formula: $K = W \times 10^5 / L^3$, where, K = Condition factor; W = weight of the fish; and L = length of the fish; the number 10^5 is a factor to bring the Ponderal index (K) near to unity (Carlander, 1970)

The length-weight relationships for males and females of *O. cunma* worked out to be

$$\log W = -5.5667 + 3.2866 \log L \text{ (Males)}$$

$$\log W = -5.8264 + 3.4551 \log L \text{ (Females)}$$

To test whether there is any significant difference between the length-weight relationship of males and females analysis of covariance was conducted. Significant differences were obtained on comparing the regression equation of males and females (Table 1). In the present observation, the calculated slope value was found to be almost similar in female and male but slightly higher value was obtained in female. In both sexes of *O. cunma*, the slope value deviates from the cubic value. The slope values of length weight equations of male and female were more than 3, however, the calculated 't' value was not significant ($p > 0.05$). Indicating the isometric growth of this species. Choudhury et al. (2012) also obtained similar results in *Botia dario*. Usually it has been observed that the values of the slope 'b' are higher in females as compared to males. This may perhaps be due to heavier weight of ovary in females as compared to testes in males (Singh et al. 2012). Similar observations were made by Rizvi et al. (2010) on *Lepturacanthus savala* and by Bhattacharya & Banik (2012) on *Ompok pabo*.

Most of the length groups show higher condition factor in female compared to male. However, the lower condition factors of female in two length group indicate the size group after spawning. The variations in the condition factor (K) observed in different length groups of *O. cunma* is depicted in (Fig. 1). This may be attributed to different factors, such as environmental condition, food availability and the gonadal maturity as suggested by many workers (Le Cren, 1951; Jhingran, 1972; Bhattacharya & Banik, 2012) on different fishes viz. perch, major carps and pabo catfish. According to them, study on the variations in the condition factor with increase in length may yield evidences concerning the size at first maturity. Variation in "K" values with increasing length in *O. cunma* indicates that juveniles have better condition factor. Bhattacharya & Banik (2012) also observed higher "K" values in juveniles of *Ompok pabo*. The present result also

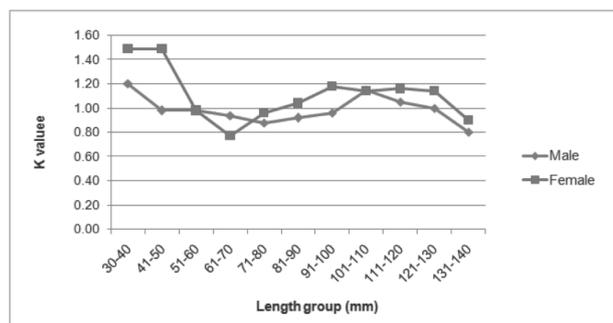


Fig. 1. Condition factor (K) in different length groups of *Osteobrama cunma*

Table 1. Analysis of variance of the length-weight relationship of *Osteobrama cunma*

Sex	Sum of squares and products			
	X ²	XY	Y ²	Regression coefficient
Female	0.7631	2.6367	10.5967	3.4551
Male	0.4376	1.4387	4.9194	3.2866
Analysis of covariance				
Source of variation	Mean square	Observed F		
Deviation from regression	4.3488	66.6993	At 1% (level of significance)	
Due to regression	0.0652		3.92 (1,100)	
			6.84 (1,125)	

supports the view of Wheatherley (1972) that even among the members of one population sampled on a single date, there may be considerable variation in condition with length. Fish populations display considerable variations in average condition, reflecting normal seasonal fluctuations in their metabolic balance and in the pattern of maturation and subsequent release of reproductive products (Goswami, 2008).

In the present study, it has been observed that the highest condition factor was found at 30-40 mm length group, which is very near the length at first maturity of around 30 mm. Similar results was obtained by Masud & Singh (2011). The fluctuations in the condition factor in different length group might be associated with cyclic physiological process by showing repeated development of gonads and shedding of mature ova (spawning) respectively during the life of the fish and it has been observed in *Gudusia chapra* by Masud & Singh (2011). Findings of the present study will be useful in stock assessment and conservation of *Osteobrama cunma*.

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