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Study of body length in relationship to other morphometric measurements in *Cetenopharynoodon* (Grass carp) ─ A deviation from cubes law

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Abstract
Cetenopharynoodon (Grass carp) a cobitidae fish inhabits lentic and lotic waters. 21 specimens of Grass carp were collected from the ponds of Combtur, Tamil Naidu from March 2013 to June 2014 with the help from local fisherman. The specimens ranged from 19-37 gm in weight and 12.2 - 14.2 cm in total length. The results indicate that the fish population is on declining trend as is evident from the number of specimens caught with hard efforts and conservation of fish is thus need of hour. In the present study an attempt is made to study the length weight relationship and other morphometric measurements of the species. It is found that the fish does not obey cube law, and its growth does not follow an isometric pattern.

Keywords: Fish; *Cetenopharynoodon* (Grass carp); Freshwater; Length weight relationship.

1. Introduction

Growth of an organism means a change in length or weight or both with the increase of age. Increment in size is due to conversion of the food matter into building mass of the body by the process of nutrition. A vector diagram known as growth curve is obtained, when length or weight of an individual are plotted against a specified time period. The curve appears as a sigmoid one, which may vary for the same fish from different localities or for the same fish at different seasons. The rate of growth may easily be influenced by many physical and physiological factors (21, 4). Theoretically, it is expressed by the formula of cube law (8), W = KL3, where, W = weight of fish, L = length of fish, K = constant. This formula is true when the fish showing symmetrical or isometric growth throughout the growth stage. However, in nature, the body proportion of a fish continuously changes with ageing. So the simple cube law expression therefore does not found properly throughout the life history of fish, as the value of K is not constant but subject to great variation. Therefore, a more satisfactory formula is given as follows:

$$\mathbf{W = aL^n, or\ (Log\ W= log\ a + n\ Log\ L)}$$

Where, W = weight of fish, L = length of fish. The values of constant **a** and **n** are determined empirically from data, as the coefficient of condition (15). These values may change with age, sex, seasons and system of measurement. The length-weight relationship is an important factor in the biological study of fishes and their stock assessments (3; 20). It describes the functional regime in weight distribution per unit size of sub-population (7). Hence, length-weight regressions have been used frequently for the estimation of weight from length because direct weight measurement can be time consuming in the field (18). The relationship is also useful for assessing the relative wellbeing of the fish population (10).

The length weight values computed for various locations are useful for various ecological parameters of the water body which govern the dimensional variation exhibited by the fish as part of adaptations to freshwater habitat. Literature on the morphometric measurements of *Cetenopharynoodon* (Grass carp) and their relationship with total length is fragmentary. The present study was aimed to focus relationship between total length and other morphometric measurements with regression analysis.

2. Materials and Methods

21 specimens of *Cetenopharynoodon* (Grass carp) were collected from ponds of Combtur, Tamil Naidu from March to June with the help from local fisherman. After collection the specimens were taken to the laboratory of the Centre of Research for Development (Annamalai University). Before preservation fishes were wiped dry and various morphometric measurements of the fishes were measured to the nearest cm and weighed (W) to the nearest 0. The morphometric measurements of each specimen were undertaken using fish measuring board, divider and vernier caliper. The statistic analysis was mainly confined to regression analysis the equation used for their competitions are:

$$W=aL^n \text{ or } \text{Log } w = \text{Log } a + b\text{Log } L$$

The correlation coefficient 'r' was evaluated by using the equation:

$$r = \frac{\sum xy}{\sqrt{\sum x^2y^2}}$$

3. Results and Discussion

Along with correlation coefficient 'r', the correlation coefficient values of all comparisons with total length are higher than 0.97 (**0.98 - 0.99),** except the comparisons between the post orbital length(Log POL), snout length(Log SL) with total length in which the 'r' is equal to **0.87**. From correlation coefficient value 'r' it is clear that the biological relationship among different morphometric characters is highly significant (Tables 1 & 2).

Table 1: Morphometric Characters

S. No	Regression equation	Correlation coefficients
1.	Log W =-1.0309 + 2.1215 Log TL	0.99
2.	Log MiD = -0.44850 + 0.7322 Log TL	0.98
3.	Log MD = -1.14248 + 1.4546 Log TL	0.98
4.	Log PAL = -0.4152 + 0.92788 Log TL	0.99
5.	Log AFL = -0.2831 + 0.4435 Log TL	0.99
6.	Log PPL = -1.4204 + 1.9472 Log TL	0.99
7.	Log POP = -0.618 +1.3199 Log TL	0.99
8.	Log HL = -1.055 1.3199 Log TL	0.98
9.	Log POL = -1.527+ 1.1425 Log TL	0.87
10.	Log PDL = -0.0848 + 0.7436Log TL	0.99
11.	Log PPL = -1.13 +1.394 Log TL	0.99
12.	Log PPL'= -0.118 +0.696 Log TL	0.99
13.	Log SL = -2.254 + 2.1837 Log TL	0.87

Table 2: Morphometric Characters

Log W	Relationship between total Length and weight
Log MiD	Relationship between total length and minimum depth
Log MD	Relationship between total length and maximum depth
Log PAL	Relationship between total length and post anal length
Log AFL	Relationship between total length and anal fin lobe length
Log PPL	Relationship between total length and pre pelvic length
Log POP	Relationship between total length and post pelvic length
Log HL	Relationship between total length and head length
Log POL	Relationship between total length and post orbital length
Log PDL	Relationship between total length and pre dorsal length
Log PPL	Relationship between total length and pre pectoral length
Log PPL'	Relationship between total length and post pectoral length
Log SL	Relationship between total length and snout length

The length weight relationship constitutes an important aspect of fishery biology. Allen (1983) suggests that the weight of the fish increases as cube of its length. The type of relationship is found in ideal fishes, which maintain a constant body shape as reported by a lot of work on length-weight relationship and conditions done on the fishes found in the Indo-Pakistan sub-continent, some of which are (6) in Indian major carps, (13) in *Trichiurus lepturus*, (9) in catfish, (17) in *Clarias batrachus*), (11) in *Johnius* spp.,1980 in *Atrobucca nibe*), (14) in Himalayan Mahseer, (5) in *Gerrus lacidus*, (16) in *Catla catla*, (2) in *Euryglossa orientalis*, (19) in *Botia lohachata*, (1) in *Euryglossa orientalis*. However, the actual relationship may depart significantly from this as fishes normally do not retain the same shape throughout their life span (8). In *Botia birdi* (Choudhray) the value of exponent (n) was found to be 2.12 (**r =0.99**) revealing that the fish does not follow an isometric pattern, and the graph between various morphometric measurements with total length is a straight line.

Thus it may be concluded that the *Cetenopharynoodon* (Grass carp) does not follow an isometric growth pattern and thus the relationship between different morphometric characteristics from cubes law. The weight of the fish increases slightly more than the square of the length as the environmental condition are not conducive to the growth of fish. Relationship between total length and other morphometric measurements is presented in Tables 1 & 2.

4. References

1. Atiqullah M. Study on length Frequency Distribution, Relative Condition factor and Ottolith weight of *Euryglossa orientalis* from Karachi coast, Pakistan J Mar Biol 2001; 7(1-2):73-79.
2. Atiqullah M, Hoda SMS. Allometric study of skeleton weight, body weight and length relationship of *Euryglossa*

orientalis (Bl. & Schn) (Family Soleidae) from Karachi coast. Pakistan J Mar Sci 1997; 6:93-97.
3. Gulland JA. Fish stock assessment: a manual of basic methods. FAO / Wiley series on Food and Agriculture. Rome, 1983.
4. Hile R. Age and growth of *Leucicthys artedi* in the lakes of the northeastern Himalayan mahseer with reference to its fishery. Indian J Anim Sci 1936; 55(1):65-70.
5. Kaliyamurthy M, Singh SK, Singh SB. Observation on length weight relationship and condition factor of *Gerrus lacidus* from the Pullical lake Intl J Acad Ichthyol 1986; 7(2):21-25.
6. Khan RA, Hussain A. The Length-weight relationship of *Labeo rohita* and *Cirrhinus mrigala* (Ham.). Proc. Indian Acad. Sci 1941; 20:120-123.
7. King RP. Length- weight relationship of Nigerian Coastal water fishes. NAGA, ICLARM Quarterly 1996; 19(4):53-68.
8. LeCren ED. The length weight relationship and seasonal cycle in gonad weight and condition in the Perch (*Perca fluviatilis*). J Anim Eco 1951; 20:201-219.
9. Majumdar P. Length-weight relationship in catfish. Indian. J Fish 1971; 18(1):179-182.
10. Moreau J, Bambino C, Pauly D. Indices of overall performance of 100 Tilapia (Cichlidae) population. In: The First Asian Fisheries Forum, Mandila, 1986, 201-221.
11. Murty VS. Observation on some aspects of biology of the croaker *Johnius* (*Johnieops*) *dussumieri* and *Johnius carutta* from Kakinada. J Mar Biol Assoc India 1979; 21:77-78.
12. Murty VS. Observation on some aspects of biology of the black croaker *Atrobucca nibe* Jordan and Thompson from Kakinada. Indian J Fish 1980; 29:65-75.
13. Narasimham KA. Length-weight relationship and relative condition factor in *Trichiurus lepturus* (Linn.) Indian J Fish 1970; 19(1):54-75.
14. Nautiyal P. Length-weight relationship and condition factor of Garhwal Himalayan mahseer with refence to its fishery. Indian J Anim Sci 1985; 55(1):65-70.
15. Richer WE. Computational interpretation of biological statistics of fish population. J Fish Res Bd Can. *Bull,* 1975, 191:382.
16. Salam A, Mahmood JA. Weight-length and condition factor relationship of a fresh water under yearling wild *Catla catla* Hamilton from River Chenab Multan. Pakistan J Zool 1993; 25:127-130.
17. Sinha AL. Length-weight relationship of Freshwater catfish, *Clarias batrachus* (Linn.). Indian J Zoology 1973; 14(2):97-102.
18. Sparre P, Venema SC. Introduction to tropical fish stock assessment. In: FAO. Fish Tech Paper. Eds: I Nabyak 1992; 1:1-37.
19. Subba BR, Pandey MR. Length-weight relationship of *Botia lohachata* (Chand) from the Sapta Koshi river, Nepal. J Nat Hist Mus 2000; 19:83-87.
20. Sumbuloglu, K, Sumbuloglu V. Biyoistatistik. *Hatipoglu Yayinlari*, Ankara 2000; 53:269.
21. Weatherley AH, Gill HS. The biology of fish growth. Academic Press, London, 1987.