



RELATIVE CONDITION FACTOR AND LENGTH-WEIGHT RELATIONSHIP OF A CARP, *LABEO GONIUS* (HAMILTON) FROM KEENJHAR LAKE, DISTRICT THATTA, SINDH, PAKISTAN

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Abstract

Relative condition factor and length-weight relationship of a carp, *Labeo gonius* (Hamilton) from Keenjhar Lake, district Thatta, Sindh were studied from 325 specimens ranging from 13.72 to 37.63 cm from 19.33 to 656.60 g in total length and weight respectively, for six months from April to September 2009. Length weight relationship was calculated separately for male, female and sexes combined as shown by the following equations:

$\log W = -3.37 + 3.67 \times \log L$ (for males)

$\log W = -2.37 + 3.26 \times \log L$ (for female)

$\log W = -3.19 + 3.46 \times \log L$ (for sexes combined)

The relative condition factor (Kn) was determined for either sex separately. The Kn values for males ranging from 0.94 to 1.06 with mean 0.99 ± 0.55 , in female these values were ranging from 0.96 to 1.13 with mean values of 1.01 ± 0.66 , while in case of sexes combined Kn values were ranging from 0.94 to 1.03 with mean was 1.0 ± 0.5 . The length-weight relationship values indicated that growth of *L. gonius* from Keenjhar Lake was found to be positive allometry and the regression co-efficient ($b = 3$) in all cases male, female and combined sexes showed ideal growth. The relative condition factor of a carp, *L. gonius* from Keenjhar Lake showed that the females were slightly in better condition ($Kn = 1.01$) than that of ($Kn = 1.0$ and 0.99) sexes combined and males respectively.

Keywords: Length-weight relationship, Condition factor, *Labeo gonius*, Keenjhar Lake.

1. Introduction

Labeo gonius (Hamilton) is the common species of minor carp found in the natural waters of Pakistan, India and Myanmar (Mirza 1982). According to Day (1878) the habitat of *L. gonius* is through out northern and eastern India, as low as the Krishna in peninsular India, Pakistan (Sindh, Punjab), Bangladesh and Burma. This medium sized carp is planktivorous in feeding habit breeds like other Indian carps in inundated rivers during the monsoon Permeshwaran *et al.*, (1974). Job *et al.*, (1955) have reported that in Mahanadi this fish, though found in rapid and slow moving waters, prefers to inhabit shallower portions of the river, where there is plentiful growth of submerged weeds.

Few isolated studies are available like Ahamed (1944) reported spawning habits and early stages in the development of *L. gonius*. Mookerjee and Ganguli (1949) studied life history of *L. gonius*. Chondar (1972) calculated length-weight relationship of mature female of *L. gonius*. Permeshwaran *et al.*, (1974) published information on the observation on the biology of *L. gonius*. Chatterji *et al.*, (1978)

worked on the food and feeding habits of *L. gonius*. Chatterji (1980) reported relative condition factor and length-weight relationship of *L. gonius*. Presently no literature on any aspect on the biology of this commercially important species is available from Pakistan. So that the present study was initiated to supply baseline data on this important species, which would be useful for the future researchers.

2 Materials and Methods

Fish samples were collected monthly during April to September 2009 from the various fishermen of the Keenjhar Lake district, Thatta. A total of 325 specimens of *L. gonius* (230 males and 95 females), ranging size from 13.72-37.63 cm in total length (TL) and weight of 19.33-656.60 g were used for the analysis. Length of fishes was measured to the nearest mm and weight up to 0.1g by using a scale sensitive portable battery operated balance (Model No., CT, 1200-S, Made in USA) 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: $\log a + b \log L$. Ponderal index

(Kn) was observed separately for males and females of different length groups. It was calculated for each 5cm length interval. The smoothed mean weights W/W , for each length group has been computed from the log formula suggested by LeCren (1951) modified formulae: $Kn = W/aL^n$ has been adapted for the calculation of the relative condition factor.

3. Results

Length- weight relationship

The length–weight equations were computed, separately for males, females and sexes combined. The sample was divided into 5cm length groups and described by Formula= aL^b , where W =weight, L = Length and a and b are constant .this expression can be transformed logarithmically as suggested by LeCren (1951) $\log a + b \log L$. When empirical values of lengths were plotted against their respective weight on an arithmetic scale, smooth curves were obtained (Fig. 1-3). A plot of weight against length on double logarithmic paper, however yielded a straight line (Figs. 4, 5, and 6) as expected.

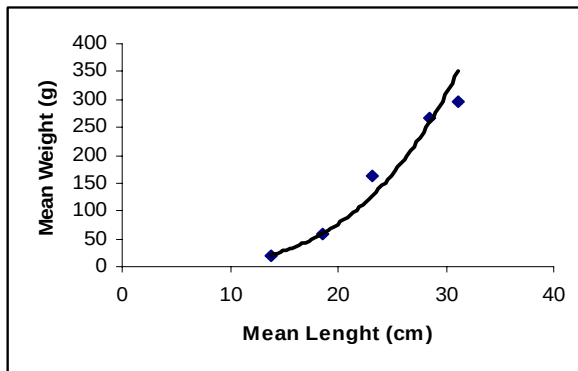


Fig. 1. Length-weight relationship of male, *Labeo gonius* (Hamilton from Keenjhar Lake District Thatta, Sindh. (Empirical values)

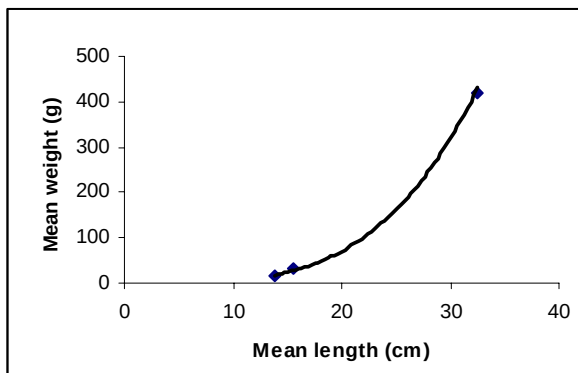


Fig. 2 Length-weight relationship of female, *Labeo gonius* (Hamilton from Keenjhar Lake District Thatta, Sindh. (Empirical values)

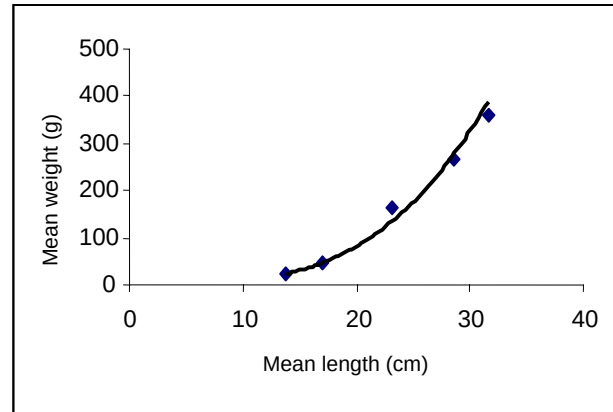


Fig. 3 Length-weight relationship of sexes combined *Labeo gonius* (Hamilton from Keenjhar Lake District Thatta, Sindh. (Empirical values)

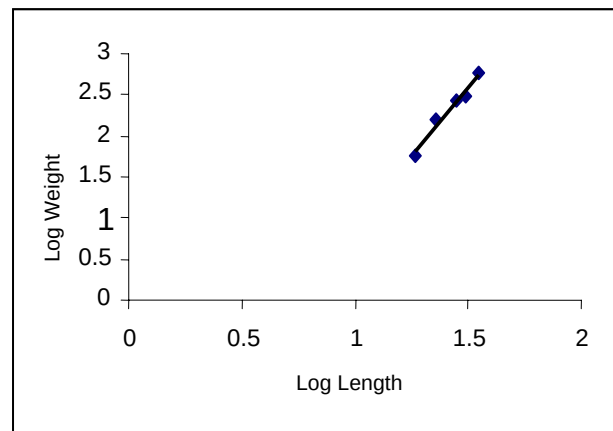


Fig. 4 Log-log relationship of male, *Labeo gonius* (Hamilton from Keenjhar Lake District Thatta, Sindh.

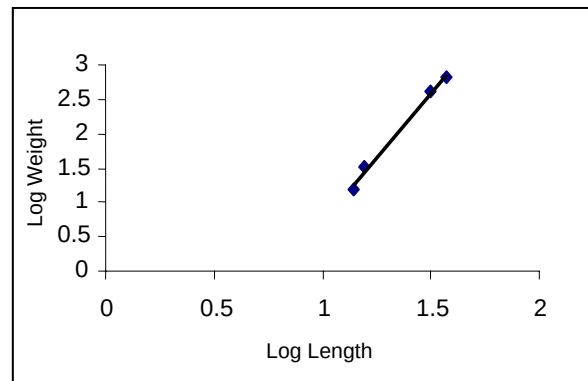


Fig. 5 Log-log relationship of female, *Labeo gonius* (Hamilton from Keenjhar Lake District Thatta, Sindh.

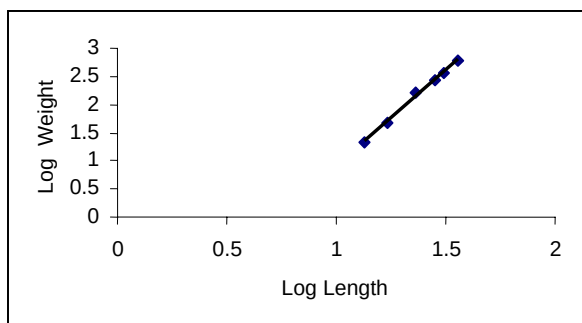


Fig. 6 Log-log relationship of sexes combined *Labeo gonius* (Hamilton from Keenjhar Lake District Thatta, Sindh.

The data of length-weight of *L. gonius* is presented in (Table 1). The regression coefficients, when calculated using the methods of least squares for

male, female and sexes combined of *L. gonius* in size range 24.8-56.8 cm gave the following equations:

$\text{Log } W = -3.37 + 3.67 \times \text{Log } L$ (for males)

$\text{Log } W = -2.37 + 3.26 \times \text{Log } L$ (for female)

$\text{Log } W = -3.19 + 3.46 \times \text{Log } L$ (for sexes combined)

As noted from the above equations values for males, females and sexes combined were practically identical and followed the cube law ($b=3$). The agreement between the empirical weight and computed weight from regression can be termed as ideal growth (positive allometry).

Relative condition factor

The relative condition factor (Kn) for all fish samples was determined from the average lengths and weights of 5cm interval of total length groups (Table 2).

Table 1. Data on length and weight of a carp, *Labeo gonius* from Keenjhar Lake (District Thatta), Sindh.

Length groups (cm)	Male		Female		Combined sexes	
	Mean length (cm)	Mean weight (g)	Mean length (cm)	Mean weight (g)	Mean length (cm)	Mean weight (g)
10.1-15.0	13.72	19.33	13.86	15.36	13.79	21.79
15.1-20.0	18.65	60.0	15.53	32.82	17.0	46.41
20.1-25.0	23.12	161.4	Nil	Nil	23.12	161.42
25.1-30.0	28.55	266.12	Nil	Nil	28.55	266.12
30.1-35.0	31.15	295.80	32.05	420	31.60	357.78
35.1-40.0	35.80	598.75	37.63	656.6	36.71	627.70

Table 2. Relative condition factor (Kn) values for male, female and combined sexes of *Labeo gonius* from Keenjhar lake (District, Thatta), Sindh.

Length group cm	Male			Female			Combined Sexes		
	Obsv weight	Calc weight	Kn	Obsv weight	Calc weight	Kn	Obsv weight	Calc weight	Kn
10.1-15.0	1.28	1.21	0.94	1.81	1.34	1.13	1.28	1.21	0.94
15.1-20.0	1.77	1.76	0.99	1.51	1.50	0.99	1.77	1.76	0.99
20.1-25.0	2.20	2.11	0.95	NIL	NIL	NIL	2.20	2.11	0.95
25.1-30.0	2.42	2.46	1.06	NIL	NIL	NIL	2.42	2.46	1.06
30.1-35.0	2.47	2.62	1.02	2.62	2.52	0.96	2.55	2.62	1.02
35.1-40.0	2.77	2.85	1.02	2.81	2.74	0.97	2.79	2.89	1.03
	Mean	=	0.99	Mean	=	1.01	Mean	=	1.00

The relative condition factor (Kn) was determined for either sex separately. The Kn values for males ranging from 0.94 to 1.06 with mean 0.99 ± 0.55 , in female these values were ranging from 0.96 to 1.13 with mean values of 1.01 ± 0.66 , while in case of sexes combined Kn values were ranging from 0.94 to 1.03 with mean was 1.0 ± 0.5 . The values of Kn showed fluctuation in all size groups of both males, females and sexes combined when t-test was applied on data of Kn for males, females and sexes combined

was found that the values are statically non-significant ($p < 0.05$). On average the females were in a slightly better conditions (i-e mean Kn = 1.01) than males and sexes combined (mean Kn = 0.99 and 1.0 respectively). The length-weight relationship values indicated that growth of *L. gonius* from Keenjhar Lake was found to be positive allometry and the regression co-efficient ($b=3$) in all cases male, female and combined sexes showed ideal growth.

4. Discussions

Relative condition factor and length–weight relationship of a carp, *Labeo gonius* (Hamilton) from Keenjhar Lake, district Thatta, Sindh were studied. In the present study it was observed that the values of regression co-efficient was found to be ideal ($b=3$) followed by cube law in all cases. Similar observations have been recorded by various authors in case of *L. gonius* like Chondar (1972) calculated b values 3.15 in mature females only. Parmeshwaran *et al.*, (1974) studied length-weight relationship and observed b values 3.08 and 3.10 in male and female respectively. Chatterji (1980) reported b values 3.10 and 3.09 in male and female respectively. The b values computed in the present study were 3.67, 3.26 and 3.46 confirms the findings of Hile (1936), Martin (1949) and LeCren (1951) who expressed that the exponent value usually lies between 2 and 4. In the present study the values of relative condition factor (K_n) of *L. gonius* from Keenjhar lake, showed fluctuation in all length groups in male, female and sexes combined and females were found to be slightly better condition than that of male and sexes combined.

References

- Ahamed, N. (1944) The spawning habitats and early stages in the development of the carp, *Labeo gonius* (Hamilton), with hints for distinguishing eggs, embryos and larvae of *Labeo gonius*, *Cirrhinus mrigala* and *wallagonia attu*. *proc nat.Inst. Sci.India*, 10, **B (3)**: 85-98
- Chatterji, A., A. Siddiqui and A. A. Khan (1978) The food and feeding habits of *Labeo gonius* (Hamilton) from the river Kali. *Proc. Nat. Inst. J. Bombay Nat. Hist. Soc.*, 75 **(1)**: 104-109.
- Chatterji, A. (1980) The relative condition factor and length weight relationship of Afresh water carp, *Labeo gonius* (Hamilton) (*Cyprinidae*, *Teleostei*) *J. Bombay. Nat. Hist. Soc.*, 77 **(3)**: 435-443.
- Chondar, S. L. (1972) The length-weight relationship of mature female *Labeo gonius* (Hamilton) from the Keetham reservoir. *J. Inland. Fish. Soc. India*. **(4)**: 216-217.
- Day, F. (1878) *The fishes of India: A natural history of the fishes of India*. Burma and Ceylon. William Dawson and son's Ltd., London, **(1)**: 778 Pp.
- Hile, R. (1936) Age and growth of Cisco, *Leuhtys artedi* (Le Suer) in the lake of north-eastern high lands. *Bull. US. Bur. Fish.*, **(48)**: 211-317.
- Job, T. J, A. David and K. N. Das (1955) Fish and fisheries of the Mahanadi in relation to the hirakud dam. *Indian J. Fish.*, 2 **(1)**: 1-40.
- Le Cren, E.D. (1951) The length-weight relationship and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatilis*). *J. Anim.Ecol.*, 20 **(4)**: 201 -219.
- Martin, W. R. (1949) The mechanics of environmental control of body form in fishes. *Univ. Toronto Stud. Biol.*, **(56)**: 1-91.
- Mookerjee, H. K. and D. N. Ganguli (1949) On the life history of the carp, *Labeo gonius* (Ham). *Proc. Zool. Soc. Bengal, Calcutta*, 2 **(2)**: 173-174.
- Mirza, M. R (1982) A contribution to the fishes of Lahore, Polymer Publications Urdu Bazaar, Lahore, 48Pp.
- Parmeshwaran, S. C. Selveraj and S. Radhakrishnan (1974) The observations on the biology of *Labeo gonius* (Hamilton). *Indian. J.Fish.*, 21 **(1)**: 54-75.