



Elucidation of Growth Status and Condition Factor of Indian Major Carp (*Catla catla*, Hamilton 1822) Reared in Extensive Culture System

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Abstract: The Indian major carp (*Catla catla*, Hamilton 1822) important cultivable fish in Indian subcontinents and aim of the present research is to determine the growth status and condition of fish reared in small village pond or extensive culture system. This study is based on length weight relationship and condition factor so length and weight of the selected species were measured during January to March 2021. The total length ranged between 19.100 - 52.500 (38.675) cm and body weight from 92.000 - 2607.000 (887.259) gm. The length frequency distribution shows that length group C was contributing 64.67% followed by length group B, D and A contributing 20.0, 10.0 and 5.33%, respectively. The correlation coefficient (r^2) 0.963, intercept (a) -2.667 and observed regression coefficient or growth constant (b) was 3.50 which showed the linear and positive relationship between the length weight variables and growth of the fish was found positive allometric. The mean value of condition factor (K) was 1.151 (A), 1.131 (B), 1.428 (C), 1.507 (D) for different length groups and 1.362 for the pooled population which showed better dwelling and good condition of fish in the culture system. These finding clearly indicated that the growth status of catla was good in village pond and aquatic environment of village pond.

Keywords: *Catla catla*, Length-weight relationship, Growth, Condition factor, Extensive culture system

The inland fisheries contributed about 70% of total fisheries production of India and there is further scope to increase the production by sustainable exploitation of the resources through advanced aquaculture practices. Indian major carps forms a dominating group among cultured fish species in inland water resources of the country (DOF 2021) and among these carps catla is the fastest growing fish species and has high economic value in Indian aquaculture sector. The appropriate information about the fish biology can assist for better culture practices and conservation strategies. The length weight relationship (LWR) and condition factor are the important tools of fish biology which provide the basic information to expedite the fish growth and production. The LWR expresses the length increment to weight gained while condition factor is an indicator of the appropriateness of water environment for fish growth and represents the flashiness of fish (Froese 2006, Mensah 2015). Further, it facilitates the comparative growth studies (Moutopoulos and Stergiou 2002), life history of fishes (Shah et al 2013), stock assessment and various components of population dynamics (Adeyemi et al 2009) and assessment of growth rate in the fishes (Johal et al 2005). Recent studies on length-weight relationships for various fish species have been carried out across India (Panda et al 2016, Borah et al 2017, Karna et al 2017, Baitha et al 2017, Nallathambi et al 2020). The length weight relationship and condition factor for

Catla catla (Hamilton 1822) has been carried out in Indian waters by many authors (Patgiri et al 2001, Prashant et al 2008, Ujjania et al 2012, Das et al 2015, Sharma et al 2016). The present study aimed to carry out length weight relationship and condition factor to determine the growth status and well being of Indian major carp *Catla catla* in Village-pond of Atgam, Valsad (Gujarat).

MATERIAL AND METHODS

The morphometric measurements like total length and weight were recorded from 300 randomly collected catla fish specimens from the landing center of village pond during January, 2021 to March, 2021 from village pond of Atgam, Valsad district, Gujarat (India) which is situated at 20°39'05" N and 73°00'27" E. -The total length of (TL) fish specimen was measured from tip of snout to the posterior end of caudal fin with the help of a measuring tape while body weight of individual fish was measured with the help of digital single pan balance. These collected data were categorized into different length groups viz., A (15-25 cm), B (25-35 cm), C (35-45 cm) and D (45-55 cm) with 10.00 cm length intervals to assess the length frequency distribution. The length weight relationship based on parabolic equation and the variables relationship from log transformed data of length and weight were evaluated by equations $W = aL^b$ (Biswas 1993) and $\text{Log } W = \text{Log } a + b \text{ Log } L$ (Froese 2006), respectively. The

correlation coefficient (*r*) of the variables (total length and total weight) were calculated following the standard statistical procedure of Snedecor and Cochran (1967). Condition factor (*K*) which shows the well-being of the fish in water body was calculated by equation $K = (W/L^3) \times 100$ (Fulton 1904). Where, 'W' is Weight (g) of fish, 'L' is total length (cm) of fish, 'a' is the Correlation coefficient (or Intercept) and 'b' is the slope (weight at unit length). For statistical analysis and graphical representation of data MS excel 2013 software was used.

RESULTS AND DISCUSSION

The length weight relationship of morphometric variables including total length (TL) and body weight (WT) was determined from logarithmic transformed data of Indian major carp catla from village pond. The total length varied from 19.100 to 52.500 cm with average length 38.675 cm while body weight ranged from 92.000 to 2607.000 gm with average of 887.259 gm (Table 1). The length data was divided into different length groups and it was observed that length group C was contributing 64.67% and dominated, whereas the length group B, D and A contributing 20.00, 10.00 and 5.33%, respectively (Table 1 and Fig. 1). The larger fishes (length group C) maintained dominance during the study which indicates active growth of the fish and favourable aquatic environment of the studied village pond. The findings of the present study are in conformity to the findings reported for different water bodies as the larger fishes dominated in Daya reservoir (48%) and Pichhola lake (64%) (Rajkumar 2005).

The length-weight relationship of variables (length and weight) were positive and strong relationships of the variables which revealed by correlation coefficient (*r*²) 0.963 (Fig. 2). The intercept (a) -2.667 and regression coefficient or growth constant (b) of 3.50 was noted during in the studied area (Fig. 2). The regression coefficient or growth constant (b) was noted as > 3.0 which shows that fish weight increases at faster rate with respect to length indicating a positive allometric growth in the studied pond. The findings of present study were in accordance with the results of Singh and

Lakhwinder (2015) and Khalid et al (2020) for catla from different water bodies. In catla, Singh and Lakhwinder (2015) documented b value of 3.20 from Harike wetland while Khalid et al (2020) observed b value of 3.23 in farmed catla thus indicating positive allometric pattern of growth. Ishtiaq and Naeem (2016) reported isometric growth while negative allometric growth in catla has been reported by Ujjania and Soni (2017). The variations in the findings could be attributed by fish size, length intervals, weather fluctuations, gonadal maturity (Macieira et al 2008), sex (Naeem et al 2010), season (Yeasmin et al 2015) and feed availability (Iqbal and Naeem 2018)

The condition factor (*K*) was 1.362 for pooled population

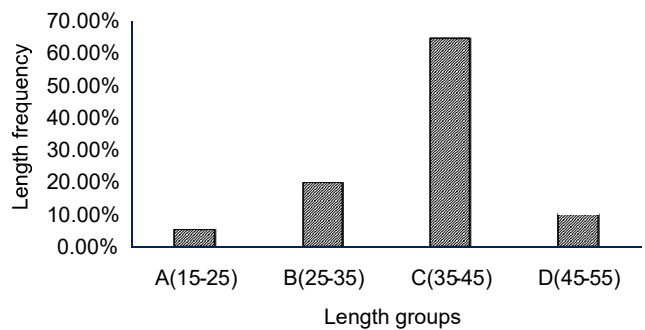


Fig. 1. Length frequency distribution of catla from Atgam village pond

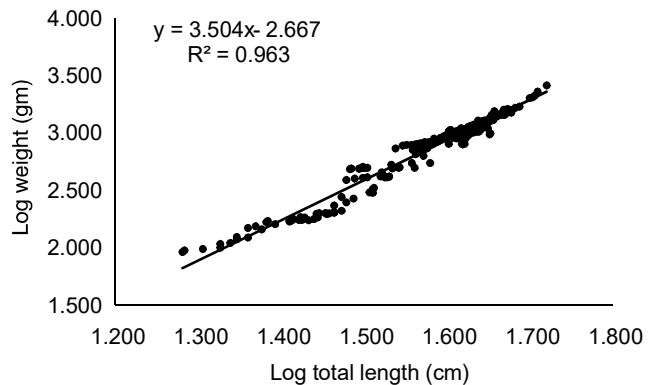


Fig. 2. Length weight relationship of pooled population of Catla from village pond

Table 1. Length weight parameters of catla in Atgam village pond

Length group	N	Total length (cm)		Weight (gm)	
		Range	Mean±SE	Range	Mean±SE
A (15-25)	16.0	19.10-24.70	22.21±0.43	92.00-171.00	127.19±6.72
B (25-35)	60.0	25.70-34.90	30.48±0.37	170.00-735.00	337.28±18.26
C (35-45)	194.0	35.20-45.00	41.24±0.19	500.00-1380.00	1009.23±13.06
D (45-55)	30.0	45.10-52.50	47.17±0.37	1301.00-2607.00	1599.80±57.58
Pooled	300.0	19.10-52.50	38.67±0.39	92.00-2607.00	887.26±24.95

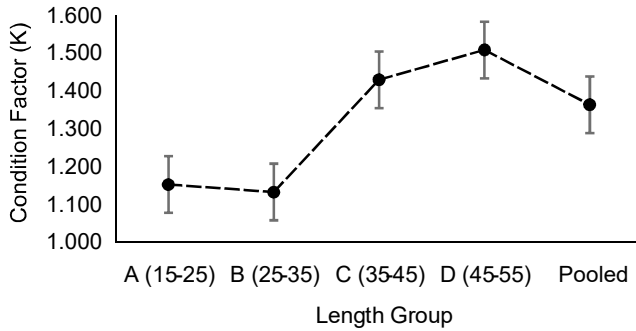


Fig. 3. Condition factor of different length groups and pooled population of Catla

while it was 1.151, 1.131, 1.428 ± 0.009 and 1.507 for different length groups A, B, C and D, respectively (Fig. 3). The condition factor of larger fishes i.e. length group C and D was much higher that might be attributed to sexual maturity and gonadal development in the adult fishes. The overall value of K was >1.0 which indicates the good condition of fish as well as favourable aquatic environmental condition of pond for the fish. Ujjania (2003) observed the oscillated K values varied from 2.78 to 3.22 for catla and reported it as an indication of suitability of water body for growth of fish. Similar findings were also documented by Prasad et al (2012) for rohu, Singh et al (2015) for catla, Das et al (2019) for common carps and Khalid et al (2020) for catla.

CONCLUSION

The present study describes the length weight relationship of *Catla catla* (Hamilton 1822) which shows the significantly linear and positive relationship. Growth exponent was > 3.0 that indicates positive allometric growth of studied species. The high value of condition factor indicates better dwelling condition and optimum environmental condition of Atgam village pond for fish growth. Present study suggested to explore and manage the village pond potentially for enhancement and quality production of fishes. These findings may serve as baseline information on growth status and condition of fishes which would be useful for management and conservation practices.

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