



# Length-Weight Relationship and Condition Factor of *Mastacembelus armatus* (Lacepède 1800) from Burhi Gandak River, North Bihar, India

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**Abstract:** The study has been conducted to investigate the length-weight relationship and Fulton's condition factor (Kn) of the freshwater spiny eel, *Mastacembelus armatus* (Lacepede 1800) from the river Burhi Gandak. A total 300 specimens of *M. armatus* were collected during July 2019 and June 2020. The observed length of *M. armatus* was ranged from 6 cm to 58.4 cm and weight from 3 to 654g. The species showed negative allometric growth pattern as depicted by the estimated b value (growth coefficient) i.e., 2.52 and the Fulton's condition factor (Kn) as  $0.29 \pm 0.15$ . Highly significant results were reported for all LWR regression parameters. These findings will serve as a foundation for the sustainable conservation and management of the fishery resources in Burhi Gandak River, North Bihar, India.

**Keywords:** Burhi Gandak, Length-weight relationship, Condition factor, *Mastacembelus armatus*, Bihar

The representative fishes of family Mastacembelidae is named spiny eels due to the presence of spines running along the back of the fish. *Mastacembelus armatus* is found in India, Pakistan, Bangladesh, Sri Lanka, Myanmar, Nepal, Thailand, Indonesia, Malaysia and southern China (Froese and Pauly 2023). Moreover, this species is one of the potential candidates in ornamental fisheries of Bihar (Raut et al 2020). Bihar is an entirely landlocked state in a subtropical region of the India, being in 7th place with a contribution of 6.41 lakh tonnes and estimated human consumption of 8.82 capita/kg. Burhi Gandak, a tributary of the Ganga river has given rise to enormous resources like Mauns, Chauras and Pokhar in the northern part of Bihar. The river Burhi Gandak is originated from central Himalaya with its basin stretching over Bihar state, has vast underutilized fisheries resources that produce an enormous diversity of species (Singh et al 2018). The ichthyofaunal diversity of the river Burhi Gandak is dominated by the order Cypriniformes (Sahil 2020). *M. armatus* fetches higher market (Rs. 300/ Kg) as food fishes in local markets of North Bihar especially when sold alive. The length-weight relationships (LWR) of fish are significant in fisheries and fish biology (Mir et al 2012). Including other morphometric traits, the LWR can be used to distinguish taxonomic groups, and to depict other life events like metamorphosis, growth, and the beginning of maturity changes over time (Thomas et al 2003). LWR can also be used to set yield equations, which can be used to calculate the number of fish landed and compare the population across time and space. Fisheries researchers can apply the LWR parameters (a and b), to estimate a fish's weight from its

length, to compute condition indices, to compare the life histories and morphologies of populations from various region (Sani et al 2010), and to investigate ontogeny allometric changes. In studies on fisheries and fish biology, Fulton's condition factor (K) is frequently utilized. In order to describe the "condition" of a certain fish, this component is derived using the relationship between a fish's weight and length (Froese 2006). The condition of sexual development, the availability of food sources, the age, and the sex of some species are all indicated by a fish's K values. However, no work has been reported so far from this region, henceforth, the present investigation has been taken up to provide baseline data for further studies, management and conservation of *M. armatus*.

## MATERIAL AND METHODS

The present investigation was conducted from July 2019 to June 2020 in Burhi Gandak river to study the length weight relationship of *M. armatus*. Fish samples were randomly collected representing various classes of lengths on monthly intervals from Pilkhi Ghat ( $26^{\circ}02'20.7''N$   $85^{\circ}33'30.8''E$ ), Dholi ( $26^{\circ}00'08.0''N$   $85^{\circ}36'23.0''E$ ) and Pusa ( $25^{\circ}59'48.7''N$   $85^{\circ}39'39.0''E$ ) sampling points in the Muzaffarpur and Samastipur using traditional gears like bamboo made traps, Ghanas and nets with floats and sinkers attached for the gear stability. The collected fishes were cleaned with water and morphometric and meristic characters were observed for the identification by using the standard taxonomical keys (Talwar and Jhingran 1991; Jayaram 1981). Length and weight measurements were taken to the nearest 1.0 mm and 0.01g

using vernier caliper and weighing balance respectively for analysis. The taxonomic identification of collected specimens were done in fish biology laboratory of College of Fisheries, Dholi. The length-weight relationship was estimated using formula  $W=aL^b$  by Le Cren (1951). Logarithmically:  $\text{Log}W = \log a + b \log L$ , where L is the total length of mussels, W is the total body weight of mussels, "a" and "b" is the intercept of regression curve and regression coefficient respectively (Froese 2006). Fish condition, fatness, or well-being are compared using the condition factor on the grounds that heavier fish of a given length are in better condition (Mir et al 2012). Using Fulton's formula, the coefficient of condition K was determined (Fulton's 1904).

$$K=100 \times W/L^3$$

Where, K=condition factor, W= mean weight of fish (gm), L= mean length of fish (mm)

## RESULTS AND DISCUSSION

The length of *M. armatus* ranged from 6 cm to maximum being 58.4 cm whereas weight ranged from 3g to 654g. The estimated b value for the *M. armatus* is 2.52 which lies within the expected range of 2.5 to 3.5. Hossain et al (2006) observed that *M. aculeatus* collected from the Mathabhanga River in southwest Bangladesh had a negative allometric growth trend, which is consistent with the findings of our study. However, also claimed that *Macrongothus pancalus* from the Mathabhanga River in southwest Bangladesh had experienced positive allometric growth. This contradicts the findings of this study and could be explained by seasonal variation, the number of specimens observed, variations in the observed length ranges, habitat, and the level of fishing pressure. Abujam and Biswas (2016) observed seasonal variations in *M. pancalus* positive allometric growth ( $b>3$ ) and negative allometric growth ( $b<3$ ) in upper Assam, India. The majority of fishes have b values between 2.7 and 3.3. (Abdallah 2002). During the present study b values are consistent with those of other investigations (Sarkar et al 2008; Mir et al 2012). Sani et al (2010) examined LWR for a variety of freshwater species from the Gomti and Betwa rivers in Uttar Pradesh, including *Gudusia chapra*, *Wallago attu*, *Sperata aor*, *Sperata seenghala*, *Clupea gurma*, *Mastacembelus armatus*, and *Puntius sophore* and observed similar trend. Khan et al (2012) revealed the isometric growth 2.5-3.5 of *Heteropneustis fossilis* and *Channa marulius* from the Ganga river basin. The length weight relationship as represented indicates negative allometric growth pattern for this species, lower value ( $<3$ ) signifies as the length of the fish grows the body becomes slimmer (Fig. 1). Based on their genetic makeup, the actual length-weight connection differs from species to species.

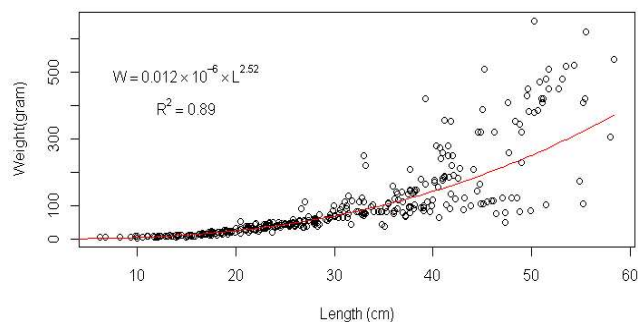


Fig. 1. Length weight relationship of *Mastacembelus armatus*

The mean value of fulton condition factor (Kn) is  $0.29 \pm 0.15$  while the mean modified condition factor (K) was 1.38 which may be attributed to different environmental conditions of river. In all size groups of males and females, the values of Kn fluctuate. In the current study's analysis of the length-weight connection and relative condition factor in *M. armatus*, the growth rate is quite excellent.

## CONCLUSION

The research provides crucial data on length-weight relationships of *Mastacembelus armatus*, aiding sustainable fishery management and biodiversity conservation in Indian rivers. Additionally, it offers baseline information for an online fish database to support the conservation of lesser-known freshwater eels in North India.

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