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# Observation on Length Weight Relationship (LWR) of Fish, *Hypophthalmichthys molitrix* (Val.) from Gobindsagar Reservoir, Himachal Pradesh, India

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***Abstract:*** ***The present study deals with the analysis of length weight relationship of Hypophthalmichthys molitrix (Val.) collected from Gobindsagar Reservoir, Himachal Pradesh, India. A total of 30 specimens were collected from January 2019 to April 2019. Total length of the specimens ranged from 19.2 cm-28.1 cm. Regression analysis was done by using SPSS software to compute the degree of relationship between length and weight and exhibited highly significant correlation 0.919** (p<0.001). The values of length weight relationship according to formula was observed to be Log TW = =-1.824+2.879 LogTL, where b = 2.87 showing negative allometric growth pattern.***

***Keywords: Length-Weight Relationship, Hypophthalmichthys molitrix (Val.), allometric growth, Gobindsagar Reservoir***

## I. INTRODUCTION

*Hypophthalmichthys molitrix* (Val.) is a fresh water fish species that lives in temperature of about (6 to 28$^{o}$C), silver carps are benthopelagic and feeds mainly on planktons present in water. In 1979, silver carp *Hypophthalmichthys molitrix* (Val.) marked the beginning of a radical change in fish catch structure in Gobindsagar Reservoir, Himachal Pradesh, India.

Fig.1 Photograph of Hypophthalmichthys molitrix (Val.)

Length weight relationship (LWR) of fish is an important tool in fishery management as it helps in estimation of the average weight of fish of a given length group by establishing a mathematical relationship (Beyer, 1987). Like any other morphometric character, length weight relationship can be used for differentiation of taxonomic units, and the relationship between length and weight changes with various development events in life such as metamorphosis, growth and onset of maturity (Thomas *et al.*, 2003).

## II. MATERIALS AND METHODS

### *A. Sampling Site*

30 fish specimens of Silver carp, *Hypophthalmichthys molitrix* (Val.) were collected from the Gobindsagar Reservoir, Himachal Pradesh during January 2019-April 2019. The specimens were preserved in 5% formaldehyde solution on the spot. Fishes were brought to laboratory for further analysis. All the measurements were taken in cm and the weight was recorded in gm.

*B. Length Weight Relationship*

This study was based on a total of 30 individuals of *Hypophthalmichthys molitrix* (Val.). The equation in the form of $\mathbf{W = aL^b}$ (Le Cren, 1951) which explains the length and weight relationship of fishes, was used in the present study.

The length-weight pairs were plotted initially in order to identify and delete the possible outliers. The 'b' is an exponent with value ranging between 2.5-3.5 demonstrating normal growth dimensions or the interpretation of relative well-being (Bagenal, 1978; King, 1996 a, b). Linear transformation was made by using the natural logarithm at the observed lengths and weights proposed by Zar (1984). The expression of the equation is represented by the following formula: **log W = b log L + log a**. A graph of the log W against log L forms a straight line with slope of "b" and a Y-axis (log w) intercept of log a.

*C. Statistical Analysis*

All the statistical calculations were done using the software SPSS (Version 25) and then the graphs were plotted using the observed values and log of observed values.

## III. RESULTS AND DISCUSSION

Length weight relationship (LWR) study is very helpful in knowing the well being growth of fish with their gonadal development (Le Cren, 1951) along with comparative study of fish life histories belonging to various habitats (Petrakis and Stergion, 1995).

The average body length and weight of the fish specimens were found to be ranged from 19.2-28.1 cm and less than 1000 gm respectively as shown in Table 1. In the present study the length-weight relationship of Silver carp, *Hypophthalmichthys molitrix* (Val.) has been found to be: $W= 0.014996848^{2.87}$ and 'b' value was 2.87 indicating negative allometric growth (Table 1 and Fig. 2, 3). The 'b' value of less than 3 indicates that the fish became slender with increase in length while a value greater than 3 indicates weight increases more compared to length (Senguttuvan and Sivakumar, 2012).

The 'b' value changes during different stages of life because most fish changes their shape as they grow in length. A significant positive high correlation coefficient (r= 0.919**) have been observed between length and weight of Silver carp, Hypophthalmichthys molitrix (Val.) (Table 1).

Table 1. Total Length, Number of Specimens, Total Weight, Correlation coefficient (r) of Hypophthalmichthys molitrix (Val.) collected from Gobindsagar Reservoir, Himachal Pradesh, India.

| Total Length (cm) | N | Weight (gms) | Correlation coefficient (r) |
|---|---|---|---|
| 19.2-28.1 | 30 | Less than 1kg | 0.919** |

A curvilinear relationship has been observed between total length and total weight for *Hypophthalmichthys molitrix* (Val.). The total length and total weight values have been converted to logarithmic scale in order to simplify data interpretation (Figs. 2&3). Regression equation has been observed to be:

LogTW=-1.824+2.879 LogTL *Hypophthalmichthys molitrix* (Val.)

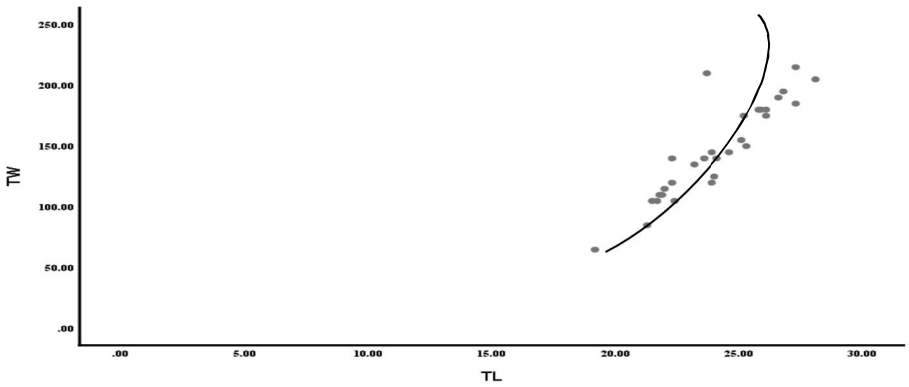


Fig.2. Curvilinear relationship between Total Length (cm) and Total Weight (gm) of *Hypophthalmichthys molitrix* (Val.) from Gobindsagar Reservoir, Himachal Pradesh, India.

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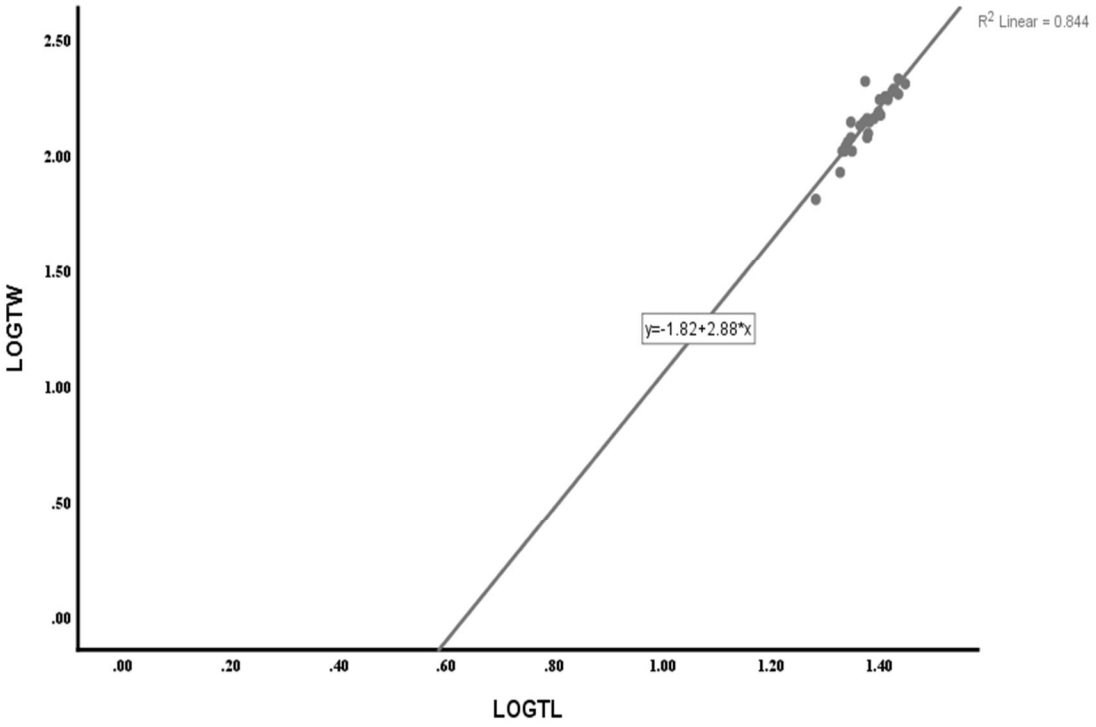


Fig.3. Graph between LogTL and LogTW of *Hypophthalmichthys molitrix* (Val.) from Gobindsagar Reservoir, Himachal Pradesh, India.

Abdollah (2002) estimated 'b' values between 2.5 to 3.44 for the fishes studied in different marine body. Ali et al. (2002), recorded value of 'b' less than 3 for Channa punctatus indicating negative allometry. Fafioye and Oluajo (2005) observed the values of 'b' to be 2.790 and 2.880 for Clarias gariepinus and Uisha africana respectively and concluded that the rate of increase in body length is not proportional to the rate of increase in body weight.

Cherif et al. (2008) studied length-weight relationship of 11 commercial fish species from Gulf of Tunis and found value of slope 'b' ranged from 2.674 to 3.368 and intercept between point 0.0021 and 0.0515. Obasohan et al. (2012) studied length-weight relationship and condition factor of five fresh water fishes i.e. Papyrocranus afer, Parachanna obscura, Malapterurus electricus, Tilapia mariae and Oreochromis niloticus in Ibiekuma Stream, Ekpoma, Nigeria. Significantly high levels of positive coefficient of correlation were observed. The value of exponent 'b' was observed to be less than 3 indicating negative allometric growth.

Mathialagan et al. (2014) conducted work on length-weight relationship of Cirrhinus reba from Lower Anicut, Tamil Nadu, India in relation to months, sex and seasons. Masud and Singh (2015) observed value of 'b' less than 3 for Salmophasia bacaila in Yamuna River, Allahabad. Similar results with value of 'b' less than 3 have been observed for Hypophthalmichthys molitrix (Val.) in present investigation.

## IV. CONCLUSION

The results of this study provide the length and weight comparisons indicating negative allometric growth. This study would be helpful for ichthyologists and taxonomists to study the growth of fish from different habitats and also facilitate the sustainable management of Hypophthalmichthys molitrix (Val.) along with additional studies of life-history, stock assessment and environmental parameters that deserve to be explored in future research.

## V. ACKNOWLEDGEMENTS

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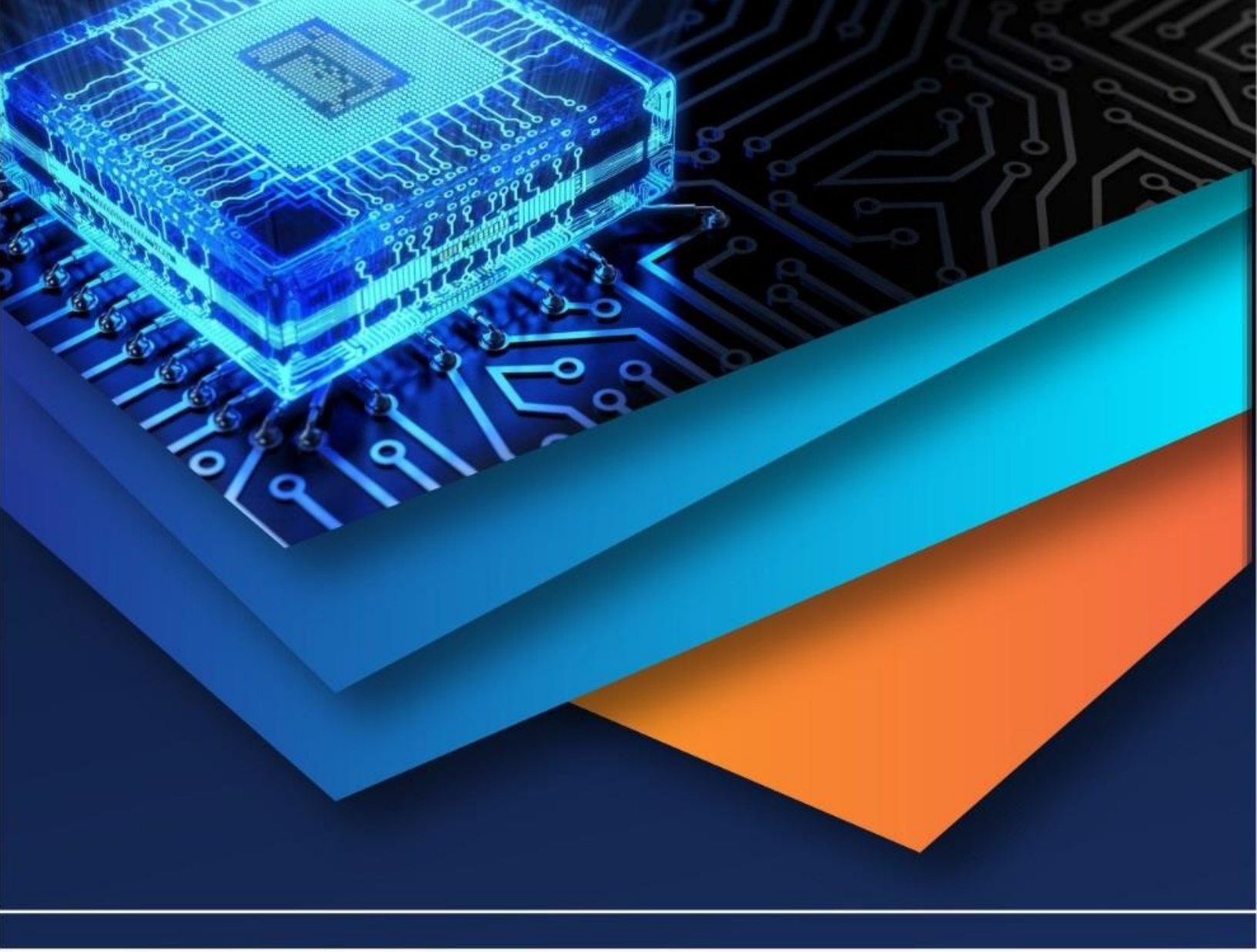

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