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Studies on relationship between length and weight of fish *Notopterus Notopterus* (Pallas) from Narmada River, at Dindori (Madhya Pradesh)

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Abstract
The length weight relationship is the most important aspect in biological studies of fishes. Length of a fish has certain mathematical relationship changes of different life phases of fish and useful to find out length when the weight is known and vice-versa. For these 50 specimens of *Notopterus notopterus* (25 male and 25 female) was observed. By using cube law method for determination of relationship between length and weight of fish was employed.

Keywords: relationship, *notopterus notopterus*, length and weight, Narmada River

1. Introduction
Notopterus notopterus is fresh water fish commonly known as 'CHAPTI' found in Narmada River at Dindori (Madhya Pradesh). The study on length- weight relationship is the most important aspect in biological studies of fish. The quality of fish shows the latest biological and substantial assets and diverge due to changed feeding habits, pathogen invasion, physiology attributes and different environmental condition (Martin-Smith, 1996; Sinovcic *et al.* 2004; Miranda *et al.* 2006 and Wootton, 1990) [1-4]. Such studies were carried out in different fishes previously by Lacrane (1951) [5], Brown (1957) [6]. and Gowswami & Sarma (1996) [7]. During studies present investigation were conducted to determine length-weight relationship in the fish *Notopterus notopterus.* Dindori is a district of Madhya Pradesh state of central India. The town of Dindori is the district headquarters. It was created on 25th May, 1998 with total 927 villages. The district is a part of Jabalpur Division. The district covers an area of 7470 sq.km. and is located on the eastern part of Madhya Pradesh, bordering the state of Chhattisgarh. It is surrounded by Shahdol in the east, Mandla in the west, Umaria in the north, and Bilaspur district of the state of Chhattisgarh in the south. Mathematically, the district is situated between the latitudes 22.17N and 23.22N and longitudes 80.35E and 80.58E It is divided into seven blocks namely Dindori, Shahpura, Mehandwani, Amarpur, Bajag, Karanjiya and Samnapur. In Dindori district summer normally starts from April and continues till end of June. April and May are severe hot months, when the summer season is at its peak. Winter normally starts from Mid November and continues till end of February. December, January and February are cold months, when the winter season is at its peak. In March climate in most parts of the district are on its bloom because of the spring. The nights are colder. Rainy season generally starts from beginning of July and extends up to the mid-September. Autumn season is generally very small from mid-September to mid-November. The extended rainy season is the reason for its short duration. Minimum temperature in the higher reaches goes down to 2^0C-3^0C during the winter months. The maximum temperature in the lower areas exceeds even 45^0 C during the peak summer month. The average rainfall in the district is nearly 1450.00 mm. Generally Block Shahpura receives highest rainfall of average of 1320.00 mm, whereas block Bajag receives least rainfall in the district of average 990.00 mm.

2. Methodology
The present study was carried out during July, August 2019. Total length of fish was measured in c.m. weighted in gm. individually, after removing surface moisture with a blotting paper. The mean length and mean weight was calculated by arranging them in 06 groups of 03 cm class intervals. The length weight relationship was determined by using general parabolic form if equation.

$W=_a L^b$

W= log a + b log L

Where 'W' is the weight in gms.

'L' is the length is cms.

'a' is a constant and 'b' is an exponent.

The average length (L) and the average weight (W) in each size group were calculated and the relationship was determined, on the size group average with the help of the formula by Lacrane (1951)[5].

$W= AL^B$

W= Average weight of fish in gms.

L= Average length of fish in cms.

3. Results and Discussion
Out of 50 samples of fish, length of the male ranges from 13 to 28, while weight from 15 to 150 gm. In case of female fish, the value ranges from 14.65 to 29 cm and 32 to 152 gm in weight. These values were then converted to logarithmic values and obtained statistical data and illustrated as an arithmetic plot. Procedure of calculations for length and weight relationship in *Notopterus notopterus* (Table - 1).

Table 1: Length weight relationship of *Notopterus notopterus*.

Size group (cm)	Average Length (cm) 'L'	Average weight 'W'	Log 'L' (x)	Log 'W' (y)	x^2	xy	Calculated Y
13-15	14.65	24.02	1.166	1.381	1.359	1.610	1.551
16-18	17.23	41.28	1.236	1.616	1.528	1.998	1.644
19-21	20.38	2.27	1.309	0.356	1.714	0.466	1.742
22-24	22.87	83.54	1.359	1.922	1.848	2.612	1.818
25-27	25.97	120	1.414	2.079	2.001	2.941	1.881
28-30	29	148.32	1.462	2.171	2.139	3.175	1.923
Total			$\sum X = 7.947$	$\sum Y = 9.525$	$\sum X^2 = 10.589$	$\sum XY = 12.802$	

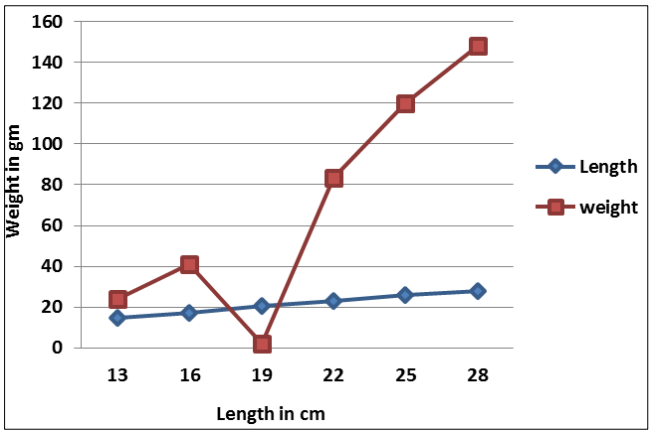

Fig 1: length weight relationsip in *Notopterus notopterus*

$x^- = 1.32195$, $y^- = 1.74563$

$\sum X = 7.947$, $\sum X^2 = 10.589$, $\sum XY = 12.802$, $\sum Y = 9.525$, $X^- = 1.32195$, $Y^- = 1.74563$.

$$B = \frac{\sum xy - Nx^-y^-}{\sum x^2 - Nx^{-2}}$$

$$B = \frac{12.802 - 6(1.32195)(1.74563)}{10.589 - 6(1.7475)}$$

$B = 2.316$

$$a = \frac{\sum y - B\sum x}{n}$$

$$a = \frac{9.525 - 2.316(7.947)}{6}$$

$a = -1.480$

$= \text{Anti log } a = 0.0673$

$Y = a + Bx$

$= -1.480 + 2.316(x)$

Expressing this in terms of W and L the equation will be.

$W = {}_aL^B$

$W = 0.0673L^{2.316}$

In the present study the exponent value was obtained within this limit. It indicates that the weight of fish is higher in relation to its length. The logarithmic values observed length and weight are given in fig. 1.

4. Conclusion

Fish is a good source of protein and is consumed by most of the people around the globe. So it is important that whatever we consume must be healthy and must contain nutritional value for proper growth and development.

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