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Relationship between various morphometric measurements in the fish *Channa Orientalis*

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ABSTRACT

The present work deals with some of the statistical relationships between various morphometric measurements of *Channa orientalis*. Studies on the statistical analysis of the morphometric characters and the relationship between total length is useful in determining the degree of an association of these body measurements. The morphometric study is important in fishery management. In the present study a straight line relationship was observed between various body measurements which suggest that the growth of the fish was isometric.

Keywords: morphometric, measurements, Relationship, *Channa orientalis*.

INTRODUCTION

The fishes constitute one of the major sources of cheap nutrition for the human beings. The nutritional value depends on their biochemical composition. Channa belongs to the category of air breathing fishes. It can live without water for nearly 14 hours provided the body is kept moist. It is available almost throughout the year. It is commonly known as "Snake headed fish". It is supposed to be the best food fish available in this region & fetches high price. Different morphometric measurements in the fishes were studied by Wainright (1988), Tandon (1983), Pathak (1976), Krumholtz and Cavanah (1968), Tobor (1974), Sultan and Shamsi (1980), Dwivedi and Rattan (1980), Dasgupta (1982) and Nasar *et al.* (1983). Sultan and Shamsi (1980) studied relationship between total length and standard length, total length and head length in Puntius sarana. In the present investigation relationship between morphometric measurements like total length and standard length, height of the body, head length, eye diameter length of snout and inter orbital width were studied in the fish *Channa orientalis*.

MATERIALS AND METHODS

The species which has been selected for the present study is of economic value and readily available throughout the year and it stands captivity well. The fish is most sensitive. It represents the natural population in the river

or water bodies of Amravati (Lattitude 20^0-56N, Longitude 77^0-45E) and is resistant to handling and transportation. The fishes were collected from localities around Amravati region. The fishes were first brought into the laboratory and transferred to the glass aquarium and were inspected for any possible injury or infection. Only the healthy fishes were selected and washed with dilute solution of potassium permanganate ($KMnO_4$, 1.0mg/1) to remove dermal infection if any. Fishes were separated in different groups and were used for studying different parameters. External characters were studied according to the characters described by Day (1958) and Shrivastava (1958). The present work deals with some of the statistical relationship between various morphometric measurements of *Channa orientalis*. Studies on the statistical analysis of the morphometric characters and the relationship between the total length and variables have been made to determine the degree of association of these body measurements, so as to enable conversion of one measurement into the other. A total of 300 fishes were used for measurements. From the data on morphometric characters, ratios commonly used in taxonomy were calculated. In the present study following morphometric measurements were taken.

1. Total length and standard length
2. Total length and height of the body
3. Total length and head length

The total length was measured from the tip of snout to the end of the longest caudal ray keeping the fish straight on the board. The standard length was measured from the tip of the snout to the end of the hipural plate. The height or depth of the body was measured from the base of the first and anal ray to the base of the dorsal fin ray.

The measurement and counts in all the cases were carried out with the help of a pair of engineering dividers and a scale graduated in millimeters. To explain the relationship between the two morphometric measurements, the equation used for regression line is-

$$Y = A' + BX$$

Where 'X' is the total length

'Y' for the variable viz, standard length, height of the body, head length.

The values of the total constants A' and B were calculated from the formula given below.

$$B=\frac{\Sigma XY - NXY}{\Sigma X^2 - NX^2} \quad \text{and}$$

$$A'=\frac{Y - BX}{N}$$

Where 'N' is the number of groups.

RESULTS AND DISCUSSIONS

The relationship between two morphometric characters was determined by the regression equation

$Y = A' + BX$

Where X stands for the total length and Y stands for the different variables like standard length, height of the body, head length. Table 1, 2, 3 shows relationship between total length and height of the body, standard length, head length. Relationship between total length X and standard length Y can be expressed by the equation Y = -5.8670 + 0.8890. A linear relationship was established indicating a high degree of correlation r = 0.998.

Table 1: Relationship between total length and standard length in the fish *Channa orientalis*.

Length group in mm	Total length in mm (X)	Standard length in mm (Y)	Calculated (Y)
71-80	76-61	62.82	62.24
81-90	85-75	70.70	70.36
91-100	93-33	78.71	78.88
101-110	105-42	87.66	87.90
111-120	115-30	96.20	96.36
121-130	125.22	105.20	105.45
131-140	135.23	114.37	114.35
141-150	145.13	122.46	123.15
151-160	154.65	131.69	131.61
161-170	164.79	140.36	140.63
171-180	171.60	147.76	146.68

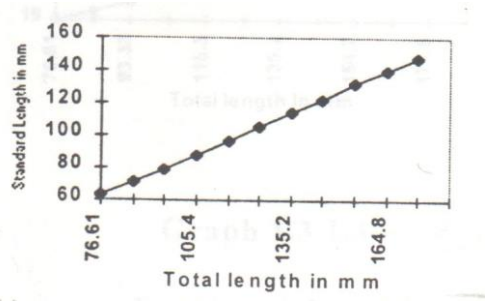

Figure 1 : Relationship between total length X and height of the body Y was found to be

Y = -1.5132 + 0.1462 X

The coefficient of correlation r = 0.998 showing high degree of correlation. (Table 2 and graph 2)

Table 2 : Relationship between total length and height of the body in the fish *Channa orientalis*

Length group in mm	Total length in mm (X)	Height of the body in mm (Y)	Calculated (Y)
71-80	76-61	9.86	9.68
81-90	85-75	11.05	11.02
91-100	93-33	12.64	12.42
101-110	105-42	13.38	13.90
111-120	115-30	15.33	15.34
121-130	125.22	17.03	16.79
131-140	135.23	18.02	18.25
141-150	145.13	19.73	19.70
151-160	154.65	20.80	21.09
161-170	164.79	22.81	22.57
171-180	171.60	23.68	23.57

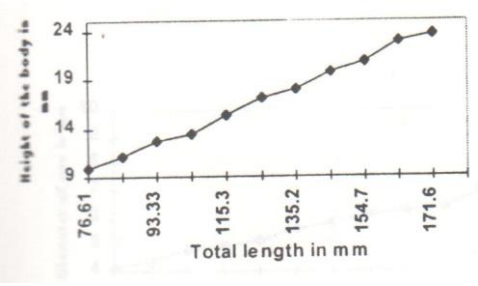

Figure 2 : Relationship between total length X and head length Y was expressed by the equation:

Y = 0.1567 + 0.2468

The relationship was linear with very high degree of correlation r = 0.998

Table 3 : Relationship between total length and Head length in the fish *Channa orientalis*

Length group in mm	Total length in mm (X)	Head length in mm (Y)	Calculated (Y)
71-80	76-61	19.28	19.06
81-90	85-75	21.08	21.31
91-100	93-33	23.85	23.68
101-110	105-42	26.32	26.18
111-120	115-30	28.56	28.61
121-130	125.22	31.20	31.06
131-140	135.23	33.35	33.53
141-150	145.13	35.78	35.97
151-160	154.65	38.00	38.32
161-170	164.79	40.27	41.07
171-180	171.60	43.51	42.50

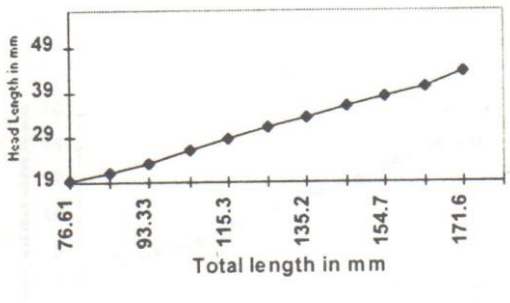

Figure 3: ???

DISCUSSION

Morphological architecture was studied on the basis of comparative study of characters of the fishes belonging to the family Ophicephalidae and from the characters given by Day (1958) Sultan and Shamsi (1981) observed linear relationship in different morphometric characters of Puntius Sarana. A linear relationship was established between total length and standard length, total length and head length in Puntius Sarana (Sultan and Shamsi; 1981). The morphometric and meristic characters of Indian carp, Labeo dero were analysed by Nasar *et al.* (1983). In their Biometric study of L. dero they revealed that the eye diameter becomes smaller in relation to head length. Similar observation has been reported for Lates niloticus (Tobor, 1974). Similar relation is observed in the fish *Channa orientalis*. In the present study a straightline relationship was observed between various body measurements which suggest that the growth of the fish was isometric.

CONCLUSION

The regression equations and correlation coefficient showing the relationship between total length and other body measurements are as follows.

Total length (X) and Standard length (Y)

Y = -5.8670 + 0.8890X, r = 0.998

Total length (X) and height of the body (Y)

Y = -1.5132 + 0.1462(X), r = 0.998

Total length (X) and head length (Y)

Y = 0.1567 + 0.2468(X), r = 0.998

From the morphometric study, it is inferred that there is high degree of correlation between these characters. A linear relationship was observed between various body measurements which suggest the growth of the fish was isometric. It attains shape like that of ideal fish.

Conflict of Interest

The author declares that there is no conflict of interest.

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