



Statistical observation on the length weight relationship of brain and body in a cold water cat fish *Amblyceps mangois* from Garhwal region

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Abstract

The paper deals with statistical analysis of fish brain and body parameter in a cold water small cat fish *Amblyceps mangois* (Ham.-Buch.) from Garhwal Central Himalayan region. During the course of study a total of 82 specimens were selected and were carried out for statistical observation. It was observed that standard length of fish fluctuated between 42.38 ± 1.80 mm to 71.00 ± 0.20 mm while the fish weight, brain length and brain weight fluctuated from 1408.69 ± 103.39 mg to 3966.00 ± 202.03 mg, 6.23 ± 0.83 mm to 8.83 ± 0.41 mm and 4.92 ± 0.95 mg to 12.00 ± 2.28 mg respectively.

Keywords: *Amblyceps mangois*, Brain length, Brain weight, Correlation, Statistical

Introduction

The fishes of the Siluroidae genus *Amblyceps mangois* are typical teleosts, which prefer pure-oxygen rich waters with sandy or gravelly bottoms. They are normally small in size. Some authors described the quantitative brain length – brain weight analysis in the fresh water fishes (Bauchet *et al.*, 1973; Jafri and Noori, 1978; Bhatt and Singh, 1982, 1983 and Bahuguna *et al.*, 2005). But no literature is available which can give information about the small cat fish brain physiology and quantitative length-weight analysis. Present communication deals with the length-weight relationship between body and brain parameters of *Amblyceps mangois*.

Materials and Method

Samples of small cat fish *Amblyceps mangois* were regularly collected during 2006-2007 from a spring fed river, Mandal, tributary of river Ramganga. During the course of study a total of 82 specimens were selected and were carried out for statistical observation. The length-weight measurement of body and brain were taken after about two month of preservation in weak formalin

solution (4%). Standard length of fish in mm was taken into consideration to avoid any measurement error. The fish were observed in a length range of 40-71 mm and were divided into seven class intervals with a class interval of 5 mm. For tracing the regression line, first a scatter line was drawn with the original data which was observed to be linear, then the method of least squares ($Y=a+bx$) was applied in which Y is dependent variable (brain length, brain weight) and X is the independent variable (the fish standard length and fish weight), a = intercept and b = slope or the regression coefficient. The coefficient of correlation (r) and coefficient of determination (r^2) were also calculated.

Results and Discussion

During the present study, the fish *Amblyceps mangois* reached a maximum standard length of 71 mm. Fish less than 40 cm could not be observed in the entire study. The summarised data on the quantitative analysis of the body-brain relationship is presented in Table 1. It was observed that the standard length of fish fluctuated from a minimum of 42.38 ± 1.80 mm to 71.00 ± 0.20 mm. The corresponding fish weight, brain length and brain weight fluctuated from 1408.69 ± 103.39 mg to 3966.00 ± 202.03 mg, 6.23 ± 0.83 mm to 8.83 ± 0.41 mm and 4.92 ± 0.95 mg to 12.00 ± 2.28 mg respectively (Table 1).

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Table 1: Summarised data on the quantitative length-weight relationship between body- brain of *Amblyceps mangois*

S. No.	Class Interval	Length of fish (SL) mm	Body weight of fish (mg)	Brain length (mm)	Brain weight (mg)	Number of fish
1.	40-45	42.38± 1.80	1408.69± 103.39	6.23± 0.83	4.92± 0.95	13
2.	46-50	48.44± 1.76	2116.33± 338.99	6.72± 0.57	7.50± 0.92	18
3.	51-55	52.26± 1.28	2477.31± 367.51	7.05± 0.62	8.53± 1.87	19
4.	56-60	57.66± 1.80	2591.44± 438.58	7.22± 0.88	9.44± 2.07	09
5.	61-65	63.20± 1.66	3296.07 ±227.78	7.47± 0.64	9.60± 0.63	15
6.	66-70	67.50± 0.71	3540.00± 56.57	8.00± 0.00	10.00± 0.00	02
7.	71-75	71.00± 0.20	3966.00± 202.03	8.83± 0.41	12.00± 2.28	06

Table 2: Regression analysis, coefficient of correlation and coefficient of determination on length-weight relationship between body and brain parameters of *Amblyceps mangois*

S.No	Value		Regression		Coefficient of Correlation	Coefficient of determination
	X	Y	a	b	r	r ²
1.	Body length	Brain weight	-2.74295	0.20174	0.9487	0.9000
2.	Brain Length	Brain weight	-9.22284	2.45632	0.9465	0.8960
3.	Body weight	Brain length	4.77607	0.00093	0.9652	0.9317
4.	Body length	Brain length	2.837789	0.078658	0.9598	0.9212
5.	Body weight	Brain weight	2.21126	0.002398	0.9567	0.9154

Regression analysis, coefficient of correlation and coefficient of determination on length-weight relationship between body and brain parameters of *Amblyceps mangois* (Ham.-Buch.) are presented in Table 2. In the present investigation five linear relationships were traced out between all dependent variables in relation to the selected independent variables. The relationship between body weight and brain length was more close ($r = 0.9652$, $r^2 = 0.9317$) followed in decreasing order by the body length and brain length ($r = 0.9598$, $r^2 = 0.9212$), body weight – brain weight ($r = 0.9567$, $r^2 = 0.9154$), body length-brain weight ($r = 0.9487$, $r^2 = 0.9000$) and brain length-brain weight ($r = 0.9465$, $r^2 = 0.8960$).

Bhatt and Singh (1982) reported straight relationship in *Puntius chinoides* (Mc Clelland)

and *Glyptothorax pectinopterus* (Mc Clelland) and found more positive correlation between body weight-brain weight ($r = 0.9872$) than body weight-brain weight ($r = 0.8736$). In latter fish more positive co-relation was observed between brain length and brain weight ($r = 0.9818$) than body length and brain length ($r = 0.8629$). Sherly (2004) in *Amblypheryngodon chakiensis* (Bleeker) observed the degree of relationship of the brain length – standard length and brain weight – standard length was higher for female than male. He also stated that in *A. chakiensis* the medium size fish showed higher brain weight rate than adult. Bahuguna *et al.* (2005) reported a continuous increase in body weight and brain weight ($r = 0.9805$) than body weight and brain length ($r = 0.9777$).



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