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SEXWISE REGRESSION ANALYSIS FOR BRAIN LENGTH - BRAIN WEIGHT RELATIONSHIP IN TELEOSTS

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Sexwise regression analysis of brain length-brain weight relationship in eight species of teleost were analysed to find out any variation in regression coefficients between males and females. The regression analysis shows a striking sexwise variation in most of the fishes. The regression coefficient is higher in females whereas the males of those fishes show a negative regression coefficient.

Key words : Regression analysis, brain length-width, teleosts.

INTRODUCTION

Brain length-brain weight dimorphism is a common feature noticed in teleosts. Brain is responsible for managing an individuals behavioural response to its environment 'Dimorphism is the product of changes in both male and female trait. Habitat complexity influences both brain and behaviour in some teleost.

Although enough work has been done on the morphology, histology and statistical analysis of brain and its various internal measurements in fishes. But sexwise regression coefficient studies in fishes were limited to those of Ebinger *et. al.* (1983), Bauchot *et.al.* (1989), Ridet *et.al.* (1990), Shumway *et.al.* (2008) and Gonzaloz, (2009).

Studies confined to body weight dimorphism in primates, birds and mammals were those of Plavcan *et.al.* (1997 & 2001), Smirnov (2004) and Linderfors (2007).

The present paper deals with the sexwise regression studies for brain length-brain weight relationship in fishes. This relationship would be useful in studying higher vertebrated also.

MATERIALS AND METHODS

Materials for the present study includes a total of 907 fishes belonging to five families were chosen. Being a sexwise regression analysis study, eight species of fishes comprising both males and females almost in equal numbers were chosen. The specimens examined were *Etroplus suratensis*, *Amblypharyngodon chakiensis*, *Rashora laviconius*, *Puntius filamentosus*, *Mystus gulio*, *Xenentodon cancila*, *Therapon jarbua* and *Glossogobius giuris*.

For morphometric study the data were taken according to Hubbs & Lagler (1947). The incised area was picked up and brains were dissected out. Measurements such as brain length and brain weight were recorded in all the specimens.

Regression analysis were done with the help of a computer by using the formula $y = bx + a$.

OBSERVATIONS

The regression analysis in eight species of fishes namely *E. suratensis, A. chakiensis, R. daniconius, P. filamentosus, M. gulio, X. cancila, T. jarbua and G. giuris* were presented in Table I.

Sexwise regression coefficients were made for each species for brain length-brain weight relationship. All fishes showed a striking sexwise variation in the regression coefficient. Generally a higher regression coefficient was found in females than males in all species except *T. jarbua*, in which males having high regression coefficient than females. The degree of this relationship, in which the regression coefficient is higher in females represented by *T. jarbua* (0.5202) followed by *P. filamentosus* (0.5272), *X. cancila* (0.3777), *M. gulio* (0.3154), *A. chakensis* (0.2743) and decreasing trend in the remaining fishes. One interesting fact noticed is the males of this species show negative regression coefficient.

Table I : Regression coefficient for brain length (BRL) and brain weight (BRW).

Fishes examined	Females	Males
Etroplus suratensis	0.0775	0.0242
Amblypharepngodon chackiensis	0.2743	- 1.0458
Rasbora daniconius	0.1662	0.0743
Puntius filamentous	0.5273	- 0.1496
Mystus gulio	0.3154	- 0.0634
Xenentodon cancila	0.3777	- 0.0480
Therapon Jarbua	- 0.1047	0.5202
Glossogobius giuris	0.1146	0.0828

DISCUSSION

The degree of correlation for various measurement of the brain and body can be calculated by quantitative analysis. Some significant allometric coefficients for intraspecific interspecific and interfamilial variabilities have been determined in a few fish species by Bauchot *et al.* (1973, 1977 & 1979). The relative brain size with phylogenetic position aspects were noticed by Bauchot *et al.* (1989). He also noticed no differences in encephalization indices between herbivores and carnivorous. In the present study omnivorous and carnivorous fishes show high degree of regression coefficient than others.

Most of the studies on sexwise dimorphisms were conducted on primates. Linderfors *et al.* (2007) noticed the sexual selection on males and social selection on females have exerted different effects on primate architecture fully supports the present finding as high regression coefficients in females may be due to social selection in the habitat. The habitat complexity influences both brain and behaviour in African cichlids in support present findings.

Gonzalez (2009) studied sex specific effects and analysed the male and female brains separately. Type of diet and care type were significantly correlated with female brain size whereas male brain size was uncorrelated with care type and this observation do not have

any relevance to the present study.

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