Morphometric Study of *Notopterous* (Male) in Relation to Body Size and Condition Factor

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ABSTRACT

This research was conducted in order to investigate the allometric growth of wild male population of Notopterous notopterous in Ghazi Ghat, river Indus. Forty-eight specimens of different body size ranging from 19.2 to 29.5 cm total length and 47.80 to 227.49 g body weight were used for the analysis of morphometric variable of head length, dorsal fin length, dorsal fin base, pectoral fin length, pectoral fin base, anal fin length, anal fin base, gap of mouth, body depth, body girth, eye diameter, inter orbital width, pre-orbital length, post orbital length, pre dorsal length, post dorsal length, pre pelvic distance and caudal fin length in Relation to total length and body weight. Slopes of the log transferred data were used to compare with an isometric slope and it was observed that all relations Showed very high correlations. Regression parameters were found to be highly Significant.

Keywords: *Notopterous notopterous*, Indus River, Length-Weight relationship, Condition factor

INTRODUCTION

Notopterous notopterous belongs to a group of catfish. Catfishes are the second major group of fresh water fish. Some people prefer these fish but some communities like Jews have preconceived opinion against them. This species thrieve well in lentic waters and is common in tanks throughout greater areas of India. Though bionomics and breeding have been investigated by several workers, no worthwile attempts towards its culture in India has been made (Talwar and Jhingran, 1991). Length weight relationship is important in fisheries science.It is notably used to estimate biomass from under water length observations or allow an estimate of condition of fish.

These measurements are useful for comparisons of life histories of fish species (Froes and Pauly, 2000; Moutopoulos and Stergiou, 2002). There are many studies on length weight relationships of some fishes. Length weight relationship provides useful information for fish species in a geographic region (Anderson and Gutreuter, 1983; Goncalves *et al*, 1996).

There are several studies on length weight relationship carried out in different Parts of the world on various fish species (Demirhan and Can, 2007; Tarkan *et al*., 2006; LeCren, E.D. 1951; Willis, D.W. 1988; Chakrborty and Singh, 1963). The present study is the first attempt for length weight, condition factor and allometery of male *Notopterous notopterous.*

MATERIALS AND METHODS

Fourty eight male specimens of *Notopterous notopterous of* variable size, 19.2 to 29.5 cm total length and 47.80 to 227.49 g weight were collected from river Indus near Ghazi Ghat with the help of cast net. Specimens were measured to the nearest 0.01 g on an electronic digital balance and total length was taken as the tip of the snout to the tip of the tail by using

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wooden tray to nearest 0.1cm. The relationship between the length and weight of a fish is usually expressed by the equation $W = a L^b$ (Ricker, 1973). Where, W is body weight (g), L is total length in (cm), a is intercept and b is slope (fish growth rate). The index of body parts was calculated by using the formula: Index of body part = weight of body parts (g)/wet body weight (g) × 100. Condition factor was calculated by the following method of Weatherly and Gill (1987) and Wootton (1998).

$$K = W / L^3 \times 100$$

The statistical analysis and graphics were performed by using computer package Microsoft Excel and Lotus 1-2-3 following Fisher and Yates (1963) and Zar (1996).

RESULTS

The value of exponent b in the weight-length relationship of present study is 3.811and the results of different relationship are presented in Table 1 and 2.

Table1. Log wet body weight (g) versus Log external body parts lengths (cm) in male *Notopterus notopterus* with n = 48 in each case

Relationships	*r*	*S. E. (b)*	*t value when b=0.33*
LogW=0.818+ 0.258Log SL	0.977***	0.008	9
LogW=0.277+ 0.198 Log HL	0.807***	0.021	6.28
LogW=0.299+ 0.252 Log BD	0.847***	0.023	3.39
LogW=0.562+ 0.306 Log BG	0.953***	0.014	1.71
Log W=0.256+ 0.137 Log IOW	0.336*	0.057	3.38
Log W=-0.482+ 0.215 Log PrOL	0.737***	0.029	3.96
Log W=0.051+ 0.215 Log PtOL	0.866***	0.018	6.38
Log W=0.321+ 0.200 Log PPD	0.762***	0.025	5.2
Log W=-0.253+ 0.117 Log ED	0.575***	0.024	8.875
Log W=0.089+ 0.164 Log DFL	0.714***	0.024	6.9127
Log W=-0.673+ 0.258 Log DFB	0.498***	0.066	1.09
Log W=0.055+ 0.215 Log PcFL	0.837***	0.021	5.47
Log W=-0.940+ 0.369 Log PcFB	0.746***	0.049	-0. 79
Log W=-0.111+ 0.170 Log AFL	0.483***	0.046	3.447
Log W=0.722+ 0.243 Log AFB	0.865***	0.021	4.143
Log W=0.00004+ 0.141 LogCFL	0.647***	0.024	7.875
Log W=-0.374+ 0.213 Log GM	0.630***	0.039	3
Log W=0.509+ 0.275 Log PrDL	0.968***	0.011	5
Log W=0.753+ 0.149 Log PtDL	0.655***	0.025	7.24

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Standard length (SL), Head length (HL), Body depth (BD), Body girth (BG), Inter orbital width (IOW), Pre orbital length (PrOL), Post orbital length (PtOL), Eye diameter (ED), Pre pelvic distance (PPD), Dorsal fin length (DFL), Dorsal fin base (DFB), Pectoral fin length (PcFL), Pectoral fin base (PcFB), Anal fin length (AFL), Anal fin base(AFB), Caudal fin length(CFL), Gap of mouth (GM), Pre pelvic distance (PrPD), Pre dorsal length (PrDL), Post dorsal length (PtDL)

***P<0.001, **P<0.01, *P<0.05, otherwise N.S>0.05

Table 2. Log total length (cm) versus Log external body parts lengths (cm) in male *Notopterus notopterus* with n = 48 in each case

Relationships	*r*	*S. E. (b)*	*t value when b=1*
Log TL=-0.077+-0.077Log SL	0.996***	0.013	2.385
Log TL=-0.378+ 0.766 Log HL	0.799***	0.085	-2.753
Log TL =-0.506+ 0.955Log BD	0.820***	0.098	-0.459
Log TL=-0.431+ 1.171 Log BG	0.934***	0.066	2.591
Log TL=-0.697+ 0.522Log IOW	0.327*	0.222	-2.153
Log TL=-1.23+ 0.857 LogPrOL	0.753***	0.111	-1.288
Log TL=-0.656+ 0.831 Log PtOL	0.855***	0.074	-2.284
Log TL=-0.383+ 0.806 Log PPD	0.785***	0.094	-2.064
Log TL=-0.698+ 0.496Log ED	0.625***	0.091	-5.538
Log TL=-0.508+ 0.675 Log DFL	0.752***	0.087	-3.736
Log TL=-1.544+ 1.013 Log DFB	0.499***	0.258	0.050
Log TL=-0.694+ 0.859 Log PcFL	0.858***	0.076	-1.855
Log TL= -2.172+ 1.438Log PcFB	0.743***	0.191	2.293
Log TL=-0.671+ 0.657 Log AFL	0.476***	0.179	-1.916
Log TL= -0.104+ 0.957Log AFB	0.872***	0.079	-0.544
Log TL=-0.512+ 0.578 LogCFL	0.682***	0.092	-4.587
Log TL=-1.102+ 0.842Log GM	0.636***	0.151	-1.046
Log TL=-0.402+ 1.065Log PrDL	0.959***	0.046	0.065
Log TL= 0.199+ 0.622Log PtDL	0.701***	0.093	-4.065

Standard length (SL), Head length (HL), Body depth (BD), Body girth (BG), Inter orbital width (IOW), Pre orbital length (PrOL), Post orbital length (PtOL), Eye diameter (ED), Pre pelvic distance (PPD), Dorsal fin length (DFL), Dorsal fin base (DFB), Pectoral fin length

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(PcFL), Pectoral fin base (PcFB), Anal fin length (AFL), Anal fin base (AFB), Caudal fin length (CFL), Gap of mouth (GM), Pre pelvic distance (PrPD), Pre dorsal length (PrDL), Post dorsal length (PtDL)

***P<0.001, **P<0.01, *P<0.05, otherwise N.S>0.05

$Y = a X^{b}$ or $W = a L^{b}$ is the general form and shows the relationship between wet body weight (W) and total length (L) (Fig-1). Where as, Y is independent variable, a is intercept and b is power. When the data is transformed in logarithmic form (fig-2) log W = log a + b log L.

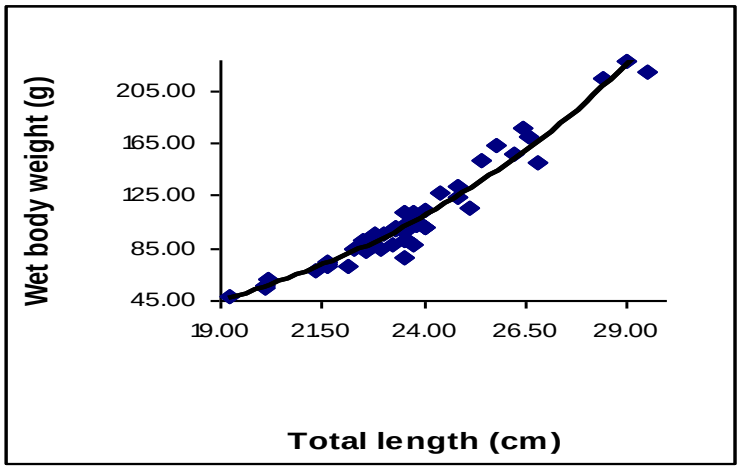

Fig 1: Relationship between total length (cm) and wet body weight (g) in *Notopterus notopterus*

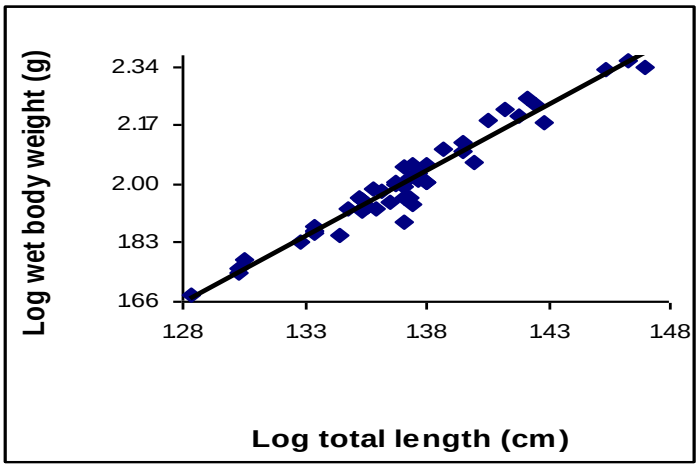

Fig 2: Relationship between log total length (cm) and log wet body weight (g) in *Notopterus notopterus*

A linear relationship is obtained with a high correlation coefficient (r = 0.975; p <0.001). The regression coefficient b has a value 3.811 and regression equation of body weight (W) on total length (TL) is:

Log W = -3.222 + 3.811 log L (r=0.975) (r^2 = 0.949)

The regression parameter of condition factor on total length and wet body weight are:

K = 0.129 + 0.027 L (r = 0.697) (r^2 = 0.486)

K = 0.598 + 0.002 W (r = 0.826) (r^2 = 0.682)

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This shows an increasing trend with increasing length or weight. When the data of head length(HL), dorsal fin length (DFL), dorsal fin base (DFB), pectoral fin length (PFL), pectoral fin base (PFB), Anal fin length (AFL), Anal fin base (AFB), Gape of mouth (GM), Body depth (BD), Body girth (BG), Eye diameter (ED), Inter orbital width (IOW), Pre orbital length (PrOL), Post orbital length (PtOL), Pre dorsal length (PrDL), Post dorsal length (PtDL), Pre pelvic distance (PPD), Caudal fin length (CFL) was plotted against total length (L) and wet body weight (W), these relationships were found to be significant and log transformed data generated high correlation coefficient (table 1 and 2).

DISCUSSION

Research on different fish species shows that there is a tendency for their regression coefficient (b) in the relation $W = a L^b$ to be close to or greater than b = 3.0, showing that increase in weight was higher as compared to the cube of its length (table 3).

Table 3. Length-Weight relationship for different fish species from different localities

Fish species	Slope(b)	Reference
Labeo rohita (immature)	3.06	Salam and Janjua, 1991.
Oncorhynchus mykiss	3.12	Naeem *et al*., 2000
Cyprinus carpio	3.17	Salam and Naeem, 2004.
Aristichthys nobilis	3.32	Naeem and Salam, A. 2005
Pagellus erthrinus	3.20	Gokce *et al*., G.., 2007
Scomber japonicus	3.49	Ceyhan *et al*., 2009
Notopterous notopterous	3.811	Present study

The values of exponent b were observed ranging from 2.391 to 3.675 for selected fish species of the small-scale fisheries off the south coast of Iskenderun Bay (Can *et al*., 2002.).

Condition factor (K) shows an increasing trend with increasing length and weight in the present study. The condition factor (K) may vary with increasing length when average weight of fish not increases in direct proportion to the cube of its length (Carlander *et al*., 1952). When b = 3.0, K remains constant, if the weight increases more rapidly than cube of length, the K would increase with increase in length and when weight not increases rapidly than cube of length, the K would decrease with the growth of fish (Javaid, and Akram, 1972).The species under study male *Notopterous notopterous* is growing faster with increasing size and leads to the conclusion that in the river Indus near Ghazi Ghaat conditions are much suitable for its rearing.

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