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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 8 (8): 1112-1114, 2005
ISSN 1028-8880

Weight Length and Condition Factor Relationship of a Fresh Water Wild *Puntius chola* from Islamabad, Pakistan

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Abstract: In the present study fifty two fresh water wild *Puntius chola* of variable sizes ranging from 5.0-9.5 cm total length and 1.95-13.02 g body weight were sampled from the reservoir of fish seed hatchery Rawalpindi to investigate the parameters of weight-length and condition factor. Log transformed regressions were used to test the allometric growth. Each fish was measured and weighed. It was observed that growth in weight is almost proportional to the cube of its length. The value of the slope b = 2.80 which coincides with the slope of that of an ideal fish. Condition factor (K) remains fairly constant with increasing length or weight. Regression parameters were found to be highly significant.

Key words: *Puntius chola*, length-weight relationship, condition factor, predictive equations

INTRODUCTION

Puntius chola is a fresh water fish and usually known as swamp barb. Its local name in Pakistan is chiddu. This fresh water species inhabits in streams, rivers, canals ponds, inundated fields and found mainly in shallow waters. *Puntius chola* is omnivorous fish, feeds on a wide variety of food like worms, crustaceans, insects, and also plant matter, so having variable feeding habits. It has commercial importance in fisheries and aquarium[1].

The present study deals with the weight-length and condition factor relationship of an important freshwater local carp, Puntius *chola* and is the first report among series of investigations I n progress about its biology in Pakistan.

The study of weight-length has its applied value in fish biology. The significance of the studies in fishes is to assess the growth of fishes in different environment[2]. The growth in animal is considered in terms of increase in volume. The volume is represented by weight, which is related to the cube of linear dimensions. It is therefor, true that a relationship exists between length (linear dimension) and weight in animal[3]. Measurement of growth as length quantify axial growth, measurement as weight quantify growth in bulk. These two categories of growth are highly correlated[4]. A fish can change its weight without changing in length or vice versa. The relationship between weight and length for fish of a given population can be analyzed either by measuring weight and length of the same fish throughout their life or of a sample of fish taken at a particular time[4].The relationship between Wight (W) and Length (L) typically takes the allometric form: $W = aL^b$, or in the linear form: Log W = Log a + b Log L, where a and b are constants estimated by regression analysis. If fish retains the same shape, it grows isometrically and the length exponent b has the value b = 3.0, a value significantly larger or smaller than b = 3.0 shows allometric growth[5,6]. A value less than b = 3.0 shows that the fish becomes lighter for its length and if greater than b = 3.0, indicates that the fish becomes heavier for its length as it grows.

The weight-length relationship provides an opportunity to calculate an index commonly used by fisheries biologists to compare the condition factor or well being of a fish[7]. This index is condition factor, K ($K = 100 \times W/L^3$). Fish with a high value of K are heavy for its length, while fish with a low K value are lighter[7]. Several studies on length-weight relationship have been carried out in other parts of the world on various fish species[8-12]. The present topic has been given due attention a few studies have been reported[13-21]. The present study is the first attempt of length-weight, condition factor and allometry of this fresh water wild *Puntius chola*, one of the important fish widely used in fisheries and aquarium as pet.

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MATERIAL AND METHODS

Fifty two fresh water wild *Puntius chola* of variable sizes ranging from 5.0- 9.5 cm total length and 1.95-13.02 g body weight were sampled from the reservoir of fish seed hatchery Rawalpindi during the month of December, 2002. Fish were selected at random and caught using a hand net. They were transported live to the laboratory in plastic containers. Fishes were killed, blotted dry and body length measurements were made by using wooden measuring tray to nearest 0.1 cm and weighed to nearest 0.01 g on an electronic digital balance(Ohaut) Condition factor was calculated by using a formula $K = 100 \times W/L^3$ following the method of Weatherley and Gill[22] and Wootton[23].

Statistical analysis, including regression analysis and calculation of correlation[24] was carried out by using a computer package Lotus 1-2-3.

RESULTS AND DISCUSSION

The relationship between wet body Wight (W) and total Length (L) is exponential having the general form $Y = aX^b$, (Fig. 1), or $W = aL^b$. Whereas Y is independent and X is dependent variable, a is intercept and b is power. When the data is transformed in logarithmic form (Fig. 2) a linear relationship is obtained with a high correlation coefficient ($r = 0.982$; $P<0.001$), having the general form.

The regression coefficient b has a value almost equal to b =3.0. The regression equation of body Wight (W) on Total Length (TL) is presented;

$$\text{Log } W = -1.617 + 2.80 \log TL \quad (r = 0.982)$$

Condition factor k when plotted against total length and wet body weight, it was found to remain constant with increasing length or weight. The regression parameters of condition factor (k) on wet body Weight (w) and Total Length (TL) are presented;

$$K = 1.989 + 0.046\ TL \quad (r = 0.352)$$

$$K = 1.738 + 0.011\ W \quad (r = 0.225)$$

Research on different fish species collected from commercial as well as from natural waters show that there is a tendency for their regression coefficient (b) in the relation $W = aL^b$ to be close to or greater than b = 3.0. Thus growth in many cases tends to be isometric[22] since b = 3.0 for isometric growth[6].of b = 2.80 which is not significantly different than b = 3.0, showing that fish is growing isometrically in relation to length. Regression parameters were found to be highly significant (Table 1).

Table 1: Length- weight relationship for different fish species from different localities

Fish species		Slope (b)	Reference No.
Labeo rohita	Immature	3.06	[16]
Cirrhinus mrigala		3.02	[27]
Oncorhynchus mykiss		2.98	[20]
Oncorhynchus mykiss		3.12	[18]
Oreochromis nilotica	Males and Females	2.99	[17]
Oreochromis nilotica	Males	3.10	[19]
Cyprinus carpio		3.17	[21]
Puntius chola		2.80	Present study

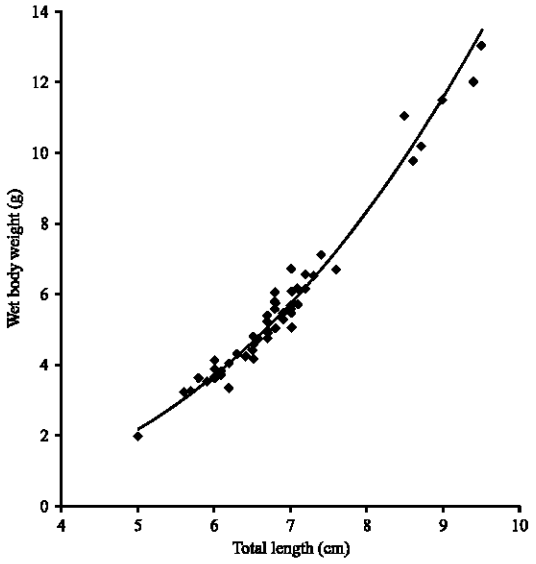

Fig. 1: Relationship between total length (cm) and wet body weight (g) in *Puntius chola*

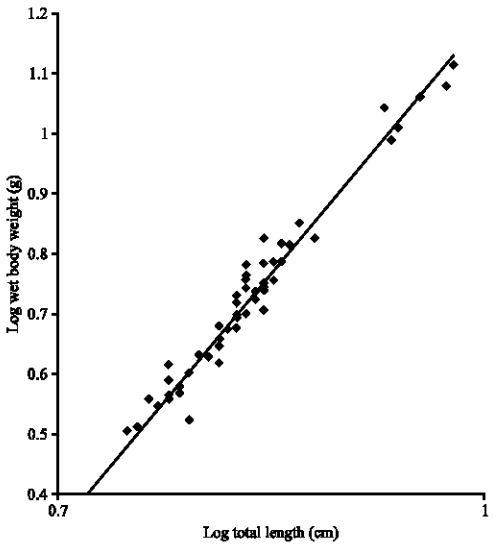

Fig. 1: Relationship between log total length (cm) and log wet body weight (g) in *Puntius chola*

Condition factor (K) appears to remain constant with increasing length and weight in the present study. The condition factor may vary with increasing length when average weight of fish does not increase in direct proportion to the cube of its length[25].

Therefore when b =3.0, K remains constant, if however the weight increase more rapidly than cube of length, the K would increase with increase in length. When weight increases less than the cube of length, K would tend to decrease with the growth of the fish[26].

The species under study, *Puntius chola* nearly resembles the ideal symmetrical fish because the value of slopes (b) of weight-length relationship is not significantly different from b=3 therefore K also constant despite growth in this fish.

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