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Original Article

Length-weight relationship: eight species of Cyprinidae from river Panjkora, Khyber Pakhtunkhwa, Pakistan

Relação peso-comprimento: oito espécies de Cyprinidae do rio Panjkora, Khyber Pakhtunkhwa, Paquistão

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Abstract

Seven hundred and twenty four fish specimens were captured from March to September 2016. The materials used in the current study were cast nets, hand nets. Eight cyprinid fish species were studied for their length-weight relationships. Parameter b in the LWR was 3.03, 3.06, 3.02, 2.29, 2.82, 3.43, 2.73 and 2.47 for *Schizothorax plagiostomus, Schizothorax esocinus, Racoma labiata, Tor putitora, Barilius vagra*, *Garra gotyla, Puntius ticto* and *Arassius auratus* respectively. Current study is the first attempt on the LWRs of cyprinid species, provide a baseline approach for conservation and /management of local fish fauna of economic importance.

Keywords: length weight relationship, cyprinids, snow trout, fresh water fishes, river Panjkora.

Resumo

Um total de 724 espécimes de peixes foi capturado de março a setembro de 2016. Os materiais usados no presente estudo foram redes de lançamento, redes de mão. Oito espécies de peixes ciprinídeos foram estudadas quanto às suas relações peso/comprimento. O parâmetro b no LWR foi 3,03, 3,06, 3,02, 2,29, 2,82, 3,43, 2,73 e 2,47 para *Schizothorax plagiostomus*, *Schizothorax esocinus*, *Racoma labiata*, *Tor putitora*, *Barilius vagra*, *Garra gotyla*, *Puntius ticto* e *Arassius auratus* respectivamente. O estudo atual é a primeira tentativa sobre os LWRs de espécies de ciprinídeos, fornecendo uma abordagem de base para a conservação e o manejo da ictiofauna local de importância econômica.

Palavras-chave: relação peso/comprimento, ciprinídeos, truta das neves, peixes de água doce, rio Panjkora.

1. Introduction

Research on relationship between length (L) and weight (W) of fish species is an approach towards management of fisheries as it provides required data for stocking the fishes (Bagenal and Tesch, 1977). Current study is important for researchers and managers of fisheries in two important determinations as (1) to guess the W from the L of a fish and (2) to match the average related factors between groups of fishes. The association between L and W of a given fish species can be used for suggesting that a weightier fish of a given L is in a healthier condition.

River Panjkora Lower Dir is famous for its ichthyofaunal diversity among the fresh water reservoirs of the country. Recently these fish have been studied by Ahmad et al. (2020), Khalid et al. (2021), Khan et al. (2021). In the present investigation, 724 specimens belonging to eight species of a family cyprinidae from the subjected area were studied to learn their length-weight relationships.

2. Materials and Methods

Lower Dir district is located at 34°, 37' to 35°, 07' North and 71°, 31' to 72°, 14' East in Pakistan and lies 823 meters asl. River Panjkora is originated in Dir (Upper) in vicinity of Kohistan. It flows toward south and passes over the mid of entire Dir districts. River Panjkora meets with river Swat

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at Totakan in Malakand district near Bosaq Bridge. Fishes were collected from River Panjkora, Khyber Pakhtunkhwa Pakistan. The fish samplings were made by cast net and hand net from March to September 2016. Each of the fish specimens were identified by using the keys "Inland fishes of India and adjacent countries provided by Talwar and Jhingran (1991), freshwater fishes of the Indian region (Jayaram, 2006), Fishes of the Punjab (Mirza and Sandhu, 2007) and an Urdu key by Mirza (1990) namely "*Pakistanki Taza Pani ki Machliyan*". Sample of fishes were measured for standard L to the nearest 0.1 cm and total weight (TW) to the nearest 0.1 g. This association between *L* and *W* were commonly expressed by the equation, $W = a \times Lb$, and usually converted into its logarithmic expression, $\log W = \log a + b \times \log L$, where *W* is body weight (g), and *L* is the total length, standard length, or fork length (cm). The 95% confidence level for b was measured to calculate if the hypothetical value of isometry fell within these limits (Froese, 2006). Of 5% significant level (a) was adopted in all the cases. The Excel Microsoft Office 2010 was used for analysis.

3. Results

Eight cyprinidian fish species were studied for the relationship between body length and body weight, collected from river Panjkora, Pakistan. Descriptive statistics and estimated parameters, including sample sizes (*n*), range of body length and weight, a and b factors and their confidence level as 95%, as well as coefficients of determinations (*r*2), are presented in Table 1. The LWR b values for three species includes *S. esocinus, S. plagiostomus, and R. labiata* near to 3.0 which represented the ideal shape of fish with isometric growth. *T. putitora, B. vagra, P. ticto* and *C. auratus*, were estimated *b>3.0,* which showed allometric growth, however *G.gotyla* was recorded b*<3.0* that showed negative allometric growth.

4. Discussion

River Panjkora and river Swat are the main freshwater ecosystem in Malakand region, Pakistan. These rivers have been focused for fish diversities by various scholar in the region. In current study maximum number of fish species collected from river Panjkora followed to the typical b values of 2.5 to 3.5 even this factor is different significantly within the limit (Froese, 2006). Greater b values of regression slope presented that the LWRs of a specific species followed the cube law. Great b values are a consideration for the general condition of appetite and gonad content of the fish (Pervin and Mortuza, 2008). When the fish utilizes the food items available in the surroundings lead to increase the weight of fish (Kamaruddin et al., 2011; Offem et al., 2007). Froese, (2006) stated that valid b values may range from 2.5 to 3.5; thus, our parameters (2.292-3.435) can be used safely within the indicated length range.

The present study findings are the first attempt and a required step to the current literature regarding the association between L and W of the fish. The findings of the current research will be useful for assessment and conservation of the explored species.

Table 1. Descriptive analysis and fitted LWRs for eight cyprinid species river Panjkora, Pakistan.

Species	N	SL range (cm) Min-Max	TW range (g) Min-Max	*a*	*b*	*r2*	*a* CL 95%	*b* CL 95%
S.plagiostomus Heckel, 1838	200	10.2-46	160-865	0.593	3.032	0.97	0.058 to 0.0121	2.815-3.251
S.esocinus Heckel) 1838	35	10.5-31	200-700	0.024	3.068	0.98	-0.062 to -0.091	2.832-3.305
R.labiatus McClelland, 1842	168	9-35.5	142-675	0.0435	3.027	0.95	0.035 to 0.0521	2.920-3.135
T.putitora Hamilton 1822	28	8.5-20	130-300	0.0032	2.292	0.80	-0.017 to 0.0256	2.131-2.451
B.vagra Hamilton 1822	48	4.2-9.5	28-130	0.039	2.828	0.89	0.032 to 0.046	2.725-2.932
G.gotyla Gray 1832	20	7-19	120-300	0.0071	3.435	0.99	0.0179 to 0.0367	2.882- 3.988
P.ticto Hamilton, 1822	45	3-9	25-105	0.0044	2.73	0.91	-0.020to -0.024	2.623-2.901
C.auratus Linnaeus, 1758	180	8-19	190-450	0.0029	2.471	0.85	-0.0314 to 0.0034	2.310-2.649

SL=standard length; TW=Total weight; CI=confidence of interval.

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