

## Length-Weight Relationship, Condition and Relative Condition Parameters of Silver Pomfret, *Pampus argenteus* Collected from Quetta City of Pakistan

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**Abstract:** Length-weight relationship (LWRs), condition (K) and relative condition factor (Kn) for male, female and combined sexes of silver pomfret, *Pampus argenteus* of family Stromateidae were examined, duration period extends from September 2014 to May 2015. In the course of the study, a total of 81 samples were collected from the local fish markets of Quetta city that include 47 males and 38 females. The obtained results of the present study revealed that a strong correlation ( $r > 0.80$ ) occurred between the length and weight of this species and was found to be significant at 5% level ( $p < 0.05$ ). The negative allometric growth pattern ( $b < 3.0$ ) were observed, but found to be highly significant (t-test;  $p < 0.05$ ) for male, female and combined sexes. The values of condition factor (K) showed the difference with increase in size or weight of fish, while the values of relative condition factor (Kn) was equal to 1.0, hence indicating that the condition of the environment of this species was favorable for its growth.

**Key words:** Length-Weight Relationship • Condition Factor • Relative Condition Factor • Silver pomfret  
• *Pampus argenteus*

### INTRODUCTION

Fish is a source of valuable animal protein and makes a major contribution to the economy of Pakistan by earning foreign exchange. Pakistan has earned an amount of Rs. 196 million in 1996 from its export [1]. Silver pomfret is the most sought after fish, in Pakistan. Two species of silver pomfret i.e., *Pampus argenteus* and *Pampus chinensis* are well-known [2], which are widely distributed along the coast of Pakistan and extends from western Asia to the Arabian Gulf and also found in the eastern part of China and the Korean Peninsula [3]. The silver pomfret, *Pampus argenteus* is locally known as "Baul Chandi" belonging to family Stromateidae (Butterfishes) of order Perciformes is one of the most commercially important fishes. Only few studies have been made for establishing the length-weight relationship and relative condition factor of the species including Devi *et al.* [4] and Singh and Gupta [5]. Length weight relationship data (LWRs) can also be

used to determine possible differences between separate unit stocks of the same species [6-8]. The condition factor (K) is used for comparing the body condition, gonadal development, fatness, or welfare of fish, based on the assumption that heavier fish of a given length are in better condition [6-7]. The relative condition factor (Kn) can provide information regarding to the variation of fish physiological status and may be used for comparing populations living in certain feeding, climate and other conditions [8]. Hence, regarding to the significance of these parameters, the present work on length-weight relationships (LWRs), condition factor (K) and relative condition factor (Kn) of silver pomfret species, *Pampus argenteus* was conducted that can also provide primary information on LWRs and growth conditions for these species from Pakistan coast, which later proved to be helpful for the fisheries biologists and fisheries managers in the management of various fish species occurs on Pakistan coast.

## MATERIALS AND METHODS

**Samples Collection:** Fish samples of the silver pomfret (*Pampus argenteus*) of family Stromateidae were collected September 2014 to May 2015 from different markets of Quetta. The total catch contained 81 individuals of *Pampus argenteus*. Total length (TL) of each specimen was measured in millimeters from the tip of snout to the end of caudal fin using measuring board. Weight (W) for each fish sample was noted on digital balance. Then fishes were immediately preserved in formaldehyde solution (10%) for about one week and after that stored in 70% ethanol for long time preservation.

Length-weight relationship data (LWRs) was calculated independently for male, female and combined sexes of *Pampus argenteus* by using cubic law followed by Zubia *et al.* [9] was as follows;

$$W = aL^b \quad (1)$$

whereas, W is the wet weight in grams, L is the total body length in millimeters; a is the intercept and b is the exponent or regression slope. In order to confirmed that whether length and weight were linearly related with each

other, the slope of the regression line (b) was subjected to t-test at 5% significant level ( $p < 0.05$ ) by using following model 2 as follows;

$$\log Wt = \log a + \log b TL$$

In this equation, Wt is weight which was taken in grams, a is the intercept, b is regression coefficient and TL is total length in millimeters. All the statistical work was done by using Minitab 17.0 version statistical computer software as followed by Zubia *et al.* [9] and Masooma *et al.* [10].

## RESULTS AND DISCUSSION

**The Result of Length Weight Relationship (LWR) Data, Condition (K) and Relative:** Condition factors (Kn) were recorded for the male, female and combined sexes of *Pampus argenteus* in the Tables 1a-1c, respectively. In the present study, data recorded for length-weight relationships (LWRs) for the male, female and combined sexes of this species was found to be strong ( $r > 0.80$ ) and highly significant at 5% level ( $p < 0.05$ ) as shown in Table 1a.

Table 1a: Regression parameters of the length-weight relationship ( $W=a \cdot L^b$ ) of the *Pampus argenteus* of family Stromatidae

	N	Length range (mm)			Weight range (g)			Regression coefficient				
		Max.	Min.	Mean± S.D	Max.	Min.	Mean± S.D	a	B	r	t-test	p-value
Combined sexes	81	186	151	172.4±8.58	96.3	59.9	80.7±9.58	-75.8	0.908	0.81*	12.4	0.00 <sup>a</sup>
Male	47	186	151	173.0±8.90	96.3	59.9	80.9±9.72	-71.4	0.88	0.81*	9.41	0.00 <sup>a</sup>
Female	34	184	152	170.7±8.39	95.0	60.0	79.7±9.99	-85.2	0.965	0.81*	7.87	0.00 <sup>a</sup>

N=sample size; SD=Standard deviation. \* shows the strong correlation (when  $r > 0.70$ ); a: significant at 5% level (when  $p < 0.05$ ).

Table 1b: Regression parameters of the length-weight relationship ( $\log W = \log a + \log b L$ ) of the *Pampus argenteus* of family Stromatidae

	N	Regression coefficient				t-test when $b=3$	p-value	GT
		Log a	Log b	R	S.E(b)			
Combined sexes	81	-2.72	2.06	0.81*	0.16	-5.88	0.00 <sup>a</sup>	-
Male	47	-2.55	1.99	0.81*	0.21	-4.81	0.00 <sup>a</sup>	-
Female	34	-3.05	2.22	0.82*	0.27	-2.89	0.00 <sup>a</sup>	-

Length (L) in cm; Weight (W) in g; N=sample size; S.D=Standard deviation; \* shows the strong correlation ( $r > 0.70$ ); a: significant at 5% level ( $p < 0.05$ ); -shows negative allometric growth pattern (when  $b < 3$ ); GT=growth type.

Table 1c: Condition factor (K) and Relative condition factor (Kn) values of the *Pampus argenteus* of family Stromatidae.

	N	Length range (mm.)			Weight range (g)			Condition factor (K) range			Relative condition factor (Kn) Range			Mean
		Max.	Min.	Mean± S.D	Max.	Min.	Mean± S.D	Max.	Min.	Mean K value	Max.	Min.	Kn value	
Combined sexes	81	186	151	172.4±8.58	96.3	59.9	80.7±9.58	0.002	0.001	0.002	1.12	0.79	0.99*	
Male	47	186	151	173.0±8.90	96.3	59.9	80.9±9.72	0.002	0.001	0.002	1.11	0.79	0.99*	
Female	34	184	152	170.7±8.39	95.0	60.0	79.7±9.99	0.002	0.001	0.002	1.11	0.79	0.99*	

Length (L) in millimeters; Weight (Wt) in grams; N=sample size.\* shows good conditions for fish growth (when  $Kn = 1.0$ )

According to Obasohan *et al.* [13], if fish grow isometrically, then the value of regression coefficient ( $b$ ) will be equal to 3.0, but under the natural condition, the values of regression coefficient ( $b$ ) may fluctuate from ideal value, that is  $b=3.0$ . In the present study, The values of regression coefficient ( $b$ ) of length weight relationships (LWRs) calculated by cube law indicating that negative allometric pattern of growth (when  $b<3.0$ ) was recorded for male, female and combined sexes of *Pampus argenteus* as shown in Table 1b, hence indicating that if the body length of fish increases than weight of body is not increasing accordingly, which might be due to several factors such as, growth, environmental conditions and condition of fish [10]. Hossain [11] and Zubia and Rehana [12] reported that LWRs in fish can be affected due to habitat, availability of food, sex, maturity stages and environmental conditions such as temperature, salinity etc.

The values of condition factor ( $K$ ) and relative condition factor ( $K_n$ ) for the male, female and combined sexes of *Pampus argenteus* were calculated and recorded in Table 1c. The values of condition factor ( $K$ ) showed the difference with increase in size or weight of fish, while the values of relative condition factor ( $K_n$ ) was equal to 1.0, hence indicating that the condition of Pakistan coast were favorable for the growth condition of *Pampus argenteus*, respectively. If the relative condition factor was found to be higher than 1.0 then the species was in much better condition. Both condition ( $K$ ) and Relative condition values ( $K_n$ ) were useful to see the fluctuations of the samples of different fishes hypothetically as well as theoretically [14].

## CONCLUSION

From the results of the present study, it had been concluded that the length weight relationships, Condition ( $K$ ) and relative condition factor ( $K_n$ ) data of any fish species could be consider as useful as a research tool in fisheries because its shows the environmental, physiological and ecological condition of fish species.

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