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Morphometric relationships of some specified species of family cyprinidae in Jinnah barrage Punjab, Pakistan

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Abstract

The paper discusses about the morphometric relationships of certain species of family cyprinidae i.e. *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla* and *Cyprinus carpio*. A total of nine morphometric measurements (Total length, Standard length, Fork length, Body depth, Head Length, Pre-dorsal fin length, Pre-pelvic fin length, Pre-pectoral fin length, and Pre-anal fin length) and body weight were noted. Basic descriptive statistical analysis and correlation coefficient (r) were analysis with total length (independent variable) and other morphometric measurements (dependent variable). The result presented that except pre-pelvic fin with total length in (*Labeo rohita* and *Cyprinus carpio*) and pre-dorsal fin with total length in (*Cirrhinus mrigala* and *Catla catla*) others all morphometric dimensions are highly correlated with total length. Also the regression coefficient (b) was less than 3.0 which indicated that all other morphometric dimensions compared with total length shows negative allometric growth and the body weight with total length shows positive allometric growth in (*Labeo rohita* = 3.260), negative allometric growth in (*Catla catla* = 2.100 and *Cyprinus carpio* = 2.400) and isomeric growth in (*Cirrhinus mrigala* = 3.016). The study represent that aquatic environment of Jinnah Barrage is appropriate for the growth of fishes.

Keywords: Morphometric relationship, Jinnah barrage, cyprinidae

1. Introduction

Fish is one of the diversified and most essential fundamentals that play a vital role in the wealth of many nations as they have been found a constant item in the diet of many nations [1]. The family cyprinidae are the most widely spread freshwater fish family and are native to Asia and Europe. In India freshwater fish fauna cyprinidae are one of the important components which plays a central role within the freshwater ecosystem. Some of the species have a role as ornamental species; some are used as food species and many of them have medicinal value and for extracting oil [2]. The morphometric measurements in fishes are the most important for describing the allometric growth and relationships with the body length [3]. For ichthyotaxonomical studies, morphometric dimensions are largely being used to segregate many fish species [4-6]. They are measurable features which are helpful for separating closely related genera, species and even populations within them [7]. Morphometric study is an important tool for measuring discreteness of the same species and is helpful to classify and identify the fishes [8]. These characters are important for easy and correct recognition of all fish species in laboratory as well as its natural habitat [9]. The study of fish morphometry is not only important to know the taxonomy but also the fitness of fish species. The structure and shape are exclusive to the species and the changes in its character are possibly related to the habit and habitat among the variants of this species [10]. The current study had been undertaken with the main objective of the study is to observe the morphometric relationships of some important species of the family Cyprinidae in Jinnah Barrage which will provide info about the growth and habitat.

2. Materials and Methods

2.1 Study area specification

The present study focuses on Jinnah Barrage (32.9201° N, 71.5191° E) tributaries of the Indus River. Jinnah Barrage (Figure 1) is located about 5 km away from the Kalabagh town in district Mianwali. Mianwali is situated in province Punjab (Pakistan) and is almost 200 m above the sea level. The construction on the barrage was begun in 1939 and was completed in

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1946. The length of the Barrage is 1,152 m (3,780 ft.). The spillway capacity of the Barrage is 950,000 cu ft. /s. Jinnah

Barrage play important role in flood control, power generation and also used for irrigation purposes.



Fig 1: Satellite map of Jinnah Barrage, Punjab Pakistan

2.2 Collection and Sampling

A sampling data were collected of six months from July to December 2017 in Jinnah Barrage. Survey was conducted in every weekend to the barrage. Species were collected by using different methods with the help of local fishermen which was working under contractor who get contract of fishing in barrage by using different nets and hooks. Different nets like cast nets, drag nets, gill nets were used by using a motor and wooden boats.

2.3 Morphometric Parameters

The morphometric parameters which was understudy includes

Total length (TL), Standard length (ST), Fork length (FL), Body depth (BD), Head Length (HL), Pre-dorsal fin length (PDL), Pre-pelvic fin length (PPvL), Pre-pectoral fin length (PPL) and Pre-anal fin length (PAL) (Figure 2 and Table 1). The total 480 specimen were collected and each specimen was 120. The morphometric parameters were measured with the help of measuring tape and measuring board in centimeters by following the method of Lowe McConnel ^[11]. The total body weight (WT) was determined in grams through weighing machine.

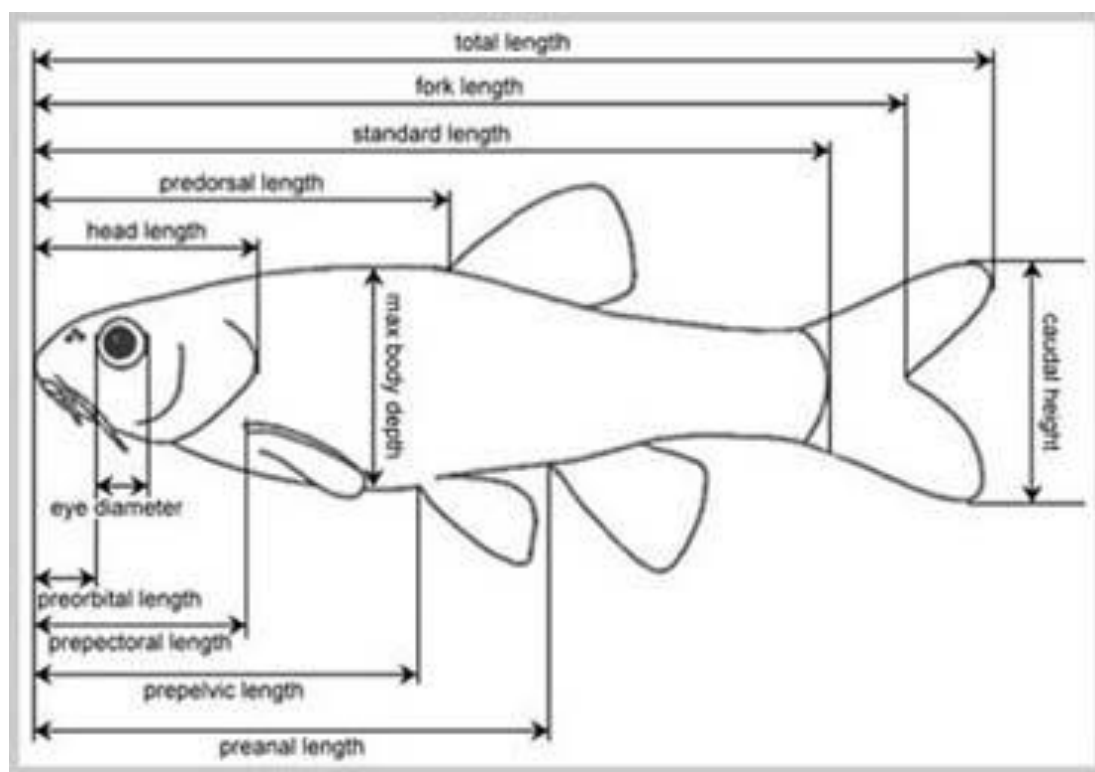


Fig 2: Fish morphometric dimensions

Table 1: Morphometric measurements

Total length (TL)	Measured from the anterior most tip of snout to the end of the caudal fin.
Standard length (SL)	Measured from tip of the snout to the last vertebrae of posterior end.
Fork length (FL)	Measured from the tip of snout to the last middle tail fin rays.
Body depth (BD)	It is the deepest distance which is measured between the dorsal and ventral surface.
Head length (HL)	Measured from the upper lip of the snout to the posterior most part of operculum.
Pre-dorsal fin length (PDL)	Length from the tip of upper lip of snout to the base of dorsal fin.
Pre-pelvic fin length (PPvL)	Length from the tip of upper lip of fish snout to the base of anterior most pelvic fin.
Pre- pectoral fin length (PPL)	Length from the snout or mouth to the origin of pectoral fin.
Pre- anal fin length (PAL)	Measured distance from the start of snout to the origin of anal fin.

2.4 Statistical Analysis

The relationships between two variables (Total length) and other morphometric measurements were determined with the help of simple formula of least square method. The main objective was to check the relationships between two variables.

$$Y = a + b X$$

“Y” is kept dependent variable for morphometric dimensions like (standard length, head length etc.)

“a” is the intercept value.

“b” is the regression coefficient.

Where “X” is the independent variable.

3. Results and Discussion

The morphometric dimensions of (*Labeo rohita*), (*Cirrhinus mrigala*), (*Catla catla*) and (*Cyprinus carpio*) given in the (Table. 2) which illustrate that for *Labeo rohita* the total length was 32.000 to 61.470 (44.401±0.489) cm, for *Cirrhinus mrigala* 33.000 to 54.600 (45.620±0.221) cm, for *Catla catla* the total length was 28.000 to 51.000 (48.216±1.110) cm and for *Cyprinus carpio* the total length was 40.000 to 65.400 (51.690±0.310) cm while the total weight of all these four species (*Labeo rohita*, *Cirrhinus mrigala*, *Catla catla* and *Cyprinus carpio*) were 300.00 to 3800.00 (1463.329±73.46) gm, 400.00 to 2400.00 (1402.360±46.12) gm, 400.00 to 4900.00 (2648.217±128.81) gm and 500.00 to 4500.00 (1806.429±51.62) gm.

Table 2: Species morphometric parameters observation

Parameters	<i>Labeo rohita</i>	<i>Cirrhinus mrigala</i>	<i>Catla catla</i>	<i>Cyprinus carpio</i>
	Min- Max Mean± SE	Min- Max Mean± SE	Min- Max Mean± SE	Min- Max Mean± SE
Total length (TL)	32.000-61.470	33.000-54.600	28.000-51.000	40.000-65.400
	44.401±0.489	45.620±0.221	48.216±1.110	51.690±0.310
Standard length (SL)	25.000-48.230	26.200-41.200	22.000-39.400	34.200-53.100
	34.601±0.376	34.210±0.176	37.361±0.568	40.230±0.236
Fork length (TL)	18.426-54.000	29.000-47.300	24.000-44.000	38.400-58.000
	37.000±0.629	40.320±0.290	42.840±1.011	47.498±0.296
Body depth (BD)	5.400-21.400	4.900-14.200	5.200-21.000	7.900-17.800
	9.237±0.189	9.201±0.982	15.489±0.421	12.391±0.360
Head length (HL)	4.900-14.300	3.900-7.200	6.000-14.400	5.300-9.600
	6.428±0.120	5.802±0.930	10.460±0.146	9.642±0.124
Pre-dorsal fin length (PDL)	9.000-24.200	8.200-19.400	9.876-24.000	11.300-22.400
	14.876±0.180	14.329±0.760	19.170±0.248	17.316±0.129
Pre-pelvic fin length (PPvL)	11.000-27.200	10.300-21.600	10.000-27.840	14.400-23.800
	16.289±0.210	16.348±0.648	20.160±0.370	19.490±0.879
Pre- pectoral fin length (PPL)	4.236-17.400	4.300-10.200	4.870-12.000	6.400-12.400
	7.286±0.980	7.296±0.980	9.270±0.142	9.348±0.230
Pre- anal fin length (PAL)	19.620-40.000	18.300-37.600	18.340-42.400	21.400-41.600
	26.960±0.341	27.692±0.186	31.700±0.420	31.986±0.394
Body weight (WT)	300.00-3800.00	400.00-2400.00	400.00-4900.00	500.00-4500.00
	1463.329±73.46	1402.360±46.12	2648.217±128.81	1806.429±51.62

The total length was kept on x-axis as Independent variable whereas the other morphometric dimensions were kept on y-axis as dependent variable and it was noted that significant correlations exist in standard length-total length (SL-TL), fork length-total length(FL-TL), body depth-total length (BD-TL), head length-total length (HL-TL), pre dorsal fin length-total length (PDL-TL), pre pelvic fin length-total length (PPvL-TL), pre pectoral fin length-total length (PPL-TL), pre anal fin length-total length (PAL-TL). The minimum correlation coefficient (r) was observed (0.50 and 0.60) in pre pelvic fin length-total length (PPvL-TL) for two species (*Labeo rohita* and *Cyprinus carpio*) and it was minimum in pre dorsal fin length -total length (PDL-TL) which was (0.60 and 0.60) in (*Cirrhinus mrigala* and *Catla catla*) while correlation coefficient (r) was observed maximum (0.79, 0.70, 0.69 and

0.79) in standard length-total length (SL-TL) for all four species including *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla* and *Cyprinus carpio* respectively (Table 3). The study bring the reliable morphometric relationships for four species of carp family for rising the value of commercial and recreational fisheries, for which very less biological information is available. The morphometric measurements significant correlation with total length was reported in Jaisamand Lake, Udaipur, India ^[12], also from Chenab River, Pakistan wild species of *Labeo calbasu* ^[13], and In India *Schizothorax richardsonii* from Uttarkashi district of Uttarakhand state ^[14] and in different ponds of city Vadodara, India ^[15].

The regression coefficient (b) were noted which was lowest (0.52 and 0.58) in pelvic fin length-total length (PPvL-TL) for

Labeo rohita and *Cirrhinus mrigala* and was observed (0.48) in head length-total length (HL-TL) for *Catla catla* and (0.68) in pre pectoral fin length (PPL) for *Cyprinus carpio*. But the highest noted was (3.26, 3.01, 2.10 and 2.40) in body weight-total length (WT-TL) for *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla* and *Cyprinus carpio* respectively. These values were significantly different in winter and summer season but within a range (2.0-4.0) [16]. In the present study the positive allometric growth ($b > 3$) shows by the value of (b), negative allometric growth ($b < 3$) and isometric growth ($b = 3$). Thus the present study shows that for all four species the other morphometric dimension with total length shows negative

allometric growth, whereas the weight (WT) with total length (TL) observed positive allometric growth ($b > 3.26$) in *Labeo rohita*, negative allometric growth ($b < 2.40$), ($b < 2.10$) was observed in *Cyprinus carpio* and *Catla catla*, while isometric growth ($b = 3.01$) in *Cirrhinus mrigala* (Table 3). This study supports the findings from Bangladesh and India. The similar growth was observed from Bangladesh [17] and from India [18]. The relationships between total length and other morphometric measurements of fish body were studied, and in *Labeo calbasu* the negative allometric growth ($b < 3.0$) was reported [13]. In *Labeo rohita* the positive allometric and isometric growth was reported by [16].

Table 3: Regression analysis of species (total length on other morphometric dimensions)

Parameters	<i>Labeo rohita</i>		<i>Cirrhinus mrigala</i>		<i>Catla catla</i>		<i>Cyprinus carpio</i>	
	Y=Log(a)+b*X	R	Y=Log(a)+b*X	R	Y=Log(a)+b*X	R	Y=Log(a)+b*X	R
Total length (TL)								
Standard length (SL)	-0.23+0.90TL	0.79	-0.50+0.89TL	0.70	-0.06+0.67TL	0.69	-0.05+0.78TL	0.79
Fork length (TL)	-0.59+1.00TL	0.58	-0.62+1.00TL	0.69	-0.19+1.01TL	0.68	-0.26+0.98TL	0.77
Body depth (BD)	-2.23+1.09TL	0.78	-1.34+1.10TL	0.68	-0.90+1.02TL	0.60	-0.98+1.10	0.69
Head length (HL)	-0.98+0.98TL	0.56	-1.26+1.62TL	0.60	-0.90+0.48TL	0.65	-0.83+0.78TL	0.70
Pre-dorsal fin length (PDL)	-0.90+1.29TL	0.70	-0.97+1.00TL	0.60	-0.56+0.58TL	0.60	-0.48+0.79TL	0.69
Pre-pelvic fin length (PPvL)	-0.46+0.52TL	0.50	-0.54+0.58TL	0.70	-0.60+0.96TL	0.63	-0.60+0.98TL	0.60
Pre- pectoral fin length (PPL)	-1.98+1.09TL	0.70	-1.58+1.135TL	0.63	-0.80+0.59TL	0.61	-0.63+0.68TL	0.70
Pre- anal fin length (PAL)	-0.46+0.98TL	0.72	-0.38+0.87TL	0.70	-0.56+1.01TL	0.67	-0.39+0.96TL	0.78
Body weight (WT)	-3.10+3.260TL	0.70	-2.26+3.01TL	0.69	-1.09+2.10TL	0.69	-1.01+2.40TL	0.78

4. Conclusion

The morphometric measurements are important for species identification and for experimental studies. In the present study the total length along with other morphometric measurements were well correlated. The indication of positive correlation coefficient (r) of the morphometric measurements with comparison to total length showed the proportional positive increase. In weight length relationships (TL-Wt) the regression coefficient (b) showed the positive allometric growth for (*Labeo rohita*), negative allometric growth for (*Catla catla*) and (*Cyprinus carpio*) and isometric growth for (*Cirrhinus mrigala*). It may be concluded that the Jinnah Barrage is good enough for the growth and survival of these species of cyprinidae family.

5. References

- Essetchi PK, Guy GT, Valentine ND, Gouli GBI, Tidiani K. Fish diversity and its relationship with environment variables in a West Africa basin. *Hydrobiology*. 2003; 505:139-146.
- Quilang JP, Basiao ZU, Pagulayan RC, Roderos RR, Barrios EB. Meristic and Morphometric variation in the silver perch: *Leiopotherapon plumbeus* (Kner, 1864) from three lakes in the Philippine. 2007; 23:561-567.
- Lleonart J, Salat J, Torres GJ. Removing Allometric Effects of Body Size in Morphological Analysis. *Journal of Theoretical Biology*. 2000; 205:85-93.
- Anyanwu AO, Ugwumba OA. Studies on the morphometric, meristic and electrophoresis patterns of *Pseudotolithus* specie. *The Zoologist*. 2003; 2(1):70-77.
- Eyo JE. Conspecific Discrimination in ratio morphometric characters among members of Pisces Genus (*Clarias scopoli*). *The Zoologist*. 2002; 1(2):23-34.
- Eyo JE. Congeneric Discrimination of morphometric characters among member of the Pisces Genus, *Clarias (Clariidae)* in Anambra River, Nigeria. *The Zoologists*. 2003; 2(1):1-17.
- Cadrin SX. Advances in morphometric analysis of fish stock structure. *Reviews in fish biology and Fisheries*. 2000; 10:91-112.
- Bagenal TB, Tesch FW. *Methods for assessment of fish production in freshwater*. 3rd ED. Oxford: Blackwell Scientific Publication, 1978, 101-136.
- Jayaram KC. *The freshwater fishes of the Indian region*. Narendra Publishing House, Delhi-110006, 1999, 551.
- Mauro JC, Leandro RM, Paulo RD. Landmark based Morphometric Analysis in Selected Species of Serranid Fishes (Perciformes: Teleostei). *Zool. Stud*. 1999; 38(3):287-294.
- LoweMcConnel RH. Identification of Freshwater fishes. In *Methods for Assessment of Fish Production in Freshwater*, 1971, 450-489.
- Balai VK, Sharma LL, Ujjania NC. Morphometric relationships of Indian major carps (*Catla catla*, *Labeo rohita*, and *Cirrhinus mrigala*) from Jaisamand Lake Udaipur, India. 2017; 5(3):547-550.
- Naem Muhammad, Asif Hussain Bhatti, Muhammad Fahad Nouman. External Morphological Study of Wild (*Labeo calbasu*) with Reference to Body Weight Total Length and Condition Factor from the River Chenab Punjab, Pakistan. *International Journal of Biology*. 2012; 6(7):429-432.
- Negi RK, Negi Tarana. Analysis of morphometric characters of (*Schizothorax richardsonii* Gray, 1832) from the Uttarkashi district of Uttarakhand state, India. *Journal of Biological Science*. 2010; 10(6):536-540.
- Pathak Neelam B, Parikh Ankita N, Mankodi Pradeep C. Morphometric Analysis of Fish Population from two Different Ponds of Vadodara City Gujarat, India. *Research Journal of Animal, Veterinary and Fisheries Science*. 2013; 1(6):6-9.
- Tesch FW. Age and growth. In: *Methods for the assessment of fish production in fresh water*. Ed. W.R. Ricker, 1968, 98-130.
- Shafi M, Quddus MMA, Islam N. Maturation and

- spawning of (*Hilsa ilisha*) (Ham - Buchanan) of the River Meghna. Dacca Univ Stud. 1978; 26:63-71.
18. Mathur PK. Studies on the maturity and fecundity of the hilsa, (*Hilsa ilisha*) (Ham) in the upper stretches of the Ganga. Indian J Fish. 1964; 11:423-448.
 19. Ujjania NC, Sharma LL, Balai Vijay Kumar. Length-weight relationship and condition factor of Indian major carp (*Labeo rohita* Ham, 1822) from southern Rajasthan, India. Applied Biological Research. 2013; 15(2):1-5.