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Morphometric, meristic characters and their relationships in *Channa punctatus* (Bloch) from River Indus near Jamshoro Sindh, Pakistan

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Abstract: The present study on the morphometric measurements and their relationship in *Channa punctatus* (Bloch) was based on 360 fish specimen collected from river Indus during March to August 2010. The standard length, lateral line length, tail fin length, dorsal fin length, pectoral fin length, girth and head length of experimental fish were found to be linear with the total length, while ventral fin (r = 0.99), pelvic fin length (r =0.99) and gape of mouth (r = 0. 99) parameters showed highly correlated with TL /HL respectively in case of male. In case of female the standard length, lateral line length, pelvic fin length, dorsal fin length, pectoral fin length and head length found to be linear. While parameters like girth (r =0.99) and tail fin length (r = 0.99) were found to be highly correlated with the total length. The six meristic characters have been counted, dorsal fin rays, ventral fin rays, pectoral fin rays, pelvic fin rays, tail fin rays, and lateral line scales count. The meristic counts did not show any significant difference between male and female. It is therefore concluded that the morphometric and meristic counts in the present study did not showed and significant difference in male and female except in pelvic fin length, ventral fin length and gape of mouth and tail fin length and girth measurement in male and female respectively. The females were found to be more pot-bellied and broader than male; male was found to be slim body. It was also inferred that there is a single homogeneous stock exists of this species in river Indus

Keywords: Morphometric measurements, meristic counts, *Channa punctatus*, River Indus.

1. INTRODUCTION

Channa punctatus also known as Murrel and locally known as "Shakur" are native to fresh water system of tropical Africa and Southern Asia (Nelson, 1984) it mostly found in rivers, canals, lakes, swamps, marshes, and rice fields (Mirza, 1982) in almost every habitat where there is water (Wee, 1982) they are plenty available in open water bodies of Pakistan, Bangladesh, Thailand, India and Nepal (Rahman, 1989). It is fast growing fish and popular due to the absence of intramuscularly bones, less fat and protein content high in comparison to other commercial species like carps (Ling, 1977). In Pollyculture system this fish is used as police fish to control the number of young tilapia (Curz and Laudenica, 1980) this fish has high market price having great tolerance to adverse water quality. Information on the morphometric measurements of fishes and the study of statistical relationship among them are essential for taxonomic work (Narejo, 2010).

Presently, no published information is available on the morphometric and meristic characters and their relationship in commercially important fish, *Channa punctatus* from Pakistan. So the present study was initiated to supply the baseline data on this commercially important fish, which would enable the future researcher to culture this species in open water.

2. MATERIALS AND METHODS

For the morphometric study a total number of 200 specimens of *Channa punctatus* (Bloch) with total length ranging from 67.0 to 245mm were collected from river Indus District, Jamshoro, Sindh, during March to August 2010. All the Measurements, except eye diameter, were taken on a millimeter scale. The eye diameter measurement was taken with the help of vernier calipers. The following measurements were made from each fish: (1) Total length (TL): the greatest length from the anterior most extremity of the fish to the end of the

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caudal fin (2) standard length (SL): from tip of the snout to the hind margin of hypural bone. (3) Head length (HL): the distance from the most anterior part on snout to the posterior edge of opercula bones. (4) Dorsal fin length (DFL): base length, greatest distance measured in a straight line between is anterior most and posterior most point of junction with the body. (5) Eye diameter (ED): the greatest distance across the cornea, that is between the margin of eye ball. (6) Girth (G): circumference of the body at dorsal fin. (7) Tail fin length (TFL): circumference of the caudal peduncle at its narrowest region. (8) Pectoral fin length: (Pec. FL): base length, greatest distance measured in a straight line between the anterior most and posterior most point of junction with the body. (9) Pelvic fin length: (Pel. FL): base length, greatest distance measured in a straight line between the anterior most and posterior point of junction with the body. (10)Ventral fin length (VFL): base length, greatest distance measured in a straight line between the anterior most and posterior most point of junction with the body. (11) Gape of mouth: (GM).

3. RESULTS

a) Morphometric measurements

Morphometric measurements in relation to various body parts in *Channa punctatus* (Bloch) were studied separately for male and female from river Indus near Jamshoro and presented in tables 1 and 2 respectively. In order to compare the growth rate of various morphometric characters in relations to total length have been calculated from 200 fish specimens ranged between 67.0 to 245 mm in total length. The following mathematical equations were obtained in regression analysis between.

TL and SL: SL = -0.01 + 0.96 TL (r = 0. 96) relationship between total length verses standard length in case of male.

TL and HL: HL= -0.24 + 0.87 TL (r = 0. 98) relationship between total length verses head length.

TL and Girth: G = -0.44 + 1. 08 (r = 0. 96) relationship between total length verses girth.

TL and DFL: DFL = -0.12 + 1.89 TL (r = 0. 92) relationship between total length verses dorsal fin length.

TL and VFL: VFL= -0.67 + 1.08TL (r=0.99) relationship between total length verses ventral fin length.

TL and PecFL: Pec.FL = -0.77 + 0.80 TL (r = 0. 96) relationship between total length verses pectoral fin length.

TL and Pel FL: Pel.FL = -1. 10 + 0.80 TL (r = 0. 99) relationship between total length verses pelvic fin length.

TL and TFL: TFL= -1.57 + 1.24 TL (r = 0. 92) relationship between total length verses tail fin length.

Whereas, the eye diameter and gape of mouth measurements were found to be highly correlated with the head length.

HL and ED: ED = - 0.03 + 0.50 HL (r = 0. 96) relationship between head length verses eye diameter. HL and GM: GM = -0.71 + 1.09 HL (r = 0. 99) relationship between head length verses gape of mouth.

TL and SL: SL = -1.0 + 1.70 TL (r = 0. 94) relationship between total length verses standard length in case of female.

TL and HL: HL -2.33 + 3.13 TL (r = 0. 94) relationship total length verses head length.

TL and Girth: Girth =-3.0 + 3.08TL (r = 0. 99) relationship between total length verses girth.

TL and DFL: DFL = - 0.23 + 0.91 TL (r = 0. 98) relationship total length verses dorsal fin length.

TL and VFL: VFL= - 027 + 0.92 TL (r = 0. 98) relationship between total length verses ventral fin length.

TL and Pec. FL: Pec. FL = - 0.3 + 1.03 TL (r = 0. 90) relationship between total length verses pectoral fin length.

TL and Pel. FL: Pel. FL = - 0.2 + 0.69 TL (r = 0. 98) relationship between total length verses pelvic fin length.

TL and TFL: TFL = - 0.6 + 0.69 TL (r = 0. 99) relationship between total length verses tail fin length.

Whereas, eye diameter and gape of mouth measurements were found to be highly correlated with the head length in this fish.

HL and ED: ED= - 0.3 + 0.66 HL (r = 0. 98) relationship between head length verses eye diameter. HL and GM: GM= - 0.25 + 0.86 HL (r = 0. 98) relationship between head length verses gape of mouth.

Table. 3 Comparison of meristic characters of males (N=141) and females (N=59) *Channa punctatus* (Bloch) from river Indus.

Meristic Characters	Male		Female	
	Range	Mean	Rang	Mean
Dorsal fin ray	25-30	30.0	25-30	30.0
Ventral fin ray	15-20	19.0	15-20	19.0
Pectoral fin ray	10-15	15.0	10-15	15.0
Pelvic fin ray	0-5	5.0	0-5	5.0
Tail fin ray	10-15	15.0	10-15	15.0
Lateral line scales counts	30-38	36.0	30-38	36.0

The reliability of the above equations would be seen to be high from the coefficient of correlation (r=) values in all cases. From the regression equations it is evident that the standard length, head length, dorsal fin length, pectoral fin length were found to be linear with total length, while gape of mouth was observed highly correlated with head length and the relationship between various body measurements were found to be linear in case of male. The tail fin length and girth measurement were found to be highly correlated in case of females (ranged between 80-135 mm) as compared to the males (ranged between 30-125 mm). It is therefore concluded that the females were found to be more pot-bailed and broader than male; male was found to be slim body. It was also inferred that there is a single homogeneous stock exists of this species in river Indus.

b) Meristic Characters

In total six meristic character were studied and counts were made of (1) Dorsal fin rays (2) Ventral fin rays (3) Pectoral fin rays (4) Pelvic fin rays (5) Tail fin rays (6) Lateral line scales count. Table 3 shows the range and mean values of meristic counts of males and females *C. punctatus*.

An application of "T" test showed that there is no significant ($p>0.05$) difference between various meristic characters in case of male and female of *Channa punctatus* from the river Indus. From the morphometric study and meristic counts of large number of specimens in the present study, it was inferred that there is a single homogenous stock of *Channa punctatus* exists in the river Indus.

4. DISCUSSION

The information on morphometric measurements of fishes and statistical relationship between them are essential for taxonomic work (Narejo, 2010). Moreover, to know the origin of stock, separation of stock or identification of commercially important species of fishes, morphometric characters are frequently used (Lashari *et al*., 2004; Narejo *et al*., 2008; Narejo 2010). The reliability of the above equations from results the results of the present study would be seen to be high from the co-efficient of correlation (r) values in all cases. From the regration it is evident that Tail fin length, Dorsal fin length, Pectoral fin length, Pelvic fin length and Head length are highly correlated with the total length (TL) another hand, Eye diameter, Gape of mouth are highly correlated with the Head length, this relationship indicated that the body measurements are linear. Similar linear relationship was also obtained by Ganguly *et al*. (1959) in *Lates calcarifer*, Mehta and Bapat (1977) in *Notopterus notopterus*, Hoque and Rahman (1985) in *Gudusia chapra*, and Lashari *et al.* (2004) in *Cirrhinus reba*. Narejo (2010) in *Gudusia chapra*. The growth rate of different morphological body parts of the *Channa punctatus* in relation to the total length are presented in percentage shown in Table 1, 2, 3 for all cases. It is also observed that the *Channa punctatus* (Bloch) in the course of present study that the females were found to be pot-bailed as compared to that of males were of slim body and smaller in size. Various authors in different fish species reported the similar observations like (Narejo *et al*., 2008 in *Tenualosa ilisha*, Lashari *et al*., 2010 in *Cirrhinus reba* and Narejo 2010 in *Gudusia chapra*). It was also inferred from the above studies that the single homogenous stock of *C. punctatus* is available in the river Indus, district Jamshoro. Earlier some authors reported homogenous stock of different fish species in River Indus, Narejo and Jafri (1997) in *Gudusia Variegata*. Narejo *et al*., (1999) in *Tenualosa ilisha*. Narejo *et al*., (2008) in *T. ilisha* the above findings accord with the present studies.

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