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Research Article

Morphological study of fish species belonging to the family Cyprinidae in Panjkora river, Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

The study evaluates the morphometric parameters of freshwater fish from the Cyprinidae family in Khyber Pakhtunkhwa, Pakistan at the Panjkora River. The ten species of the family Cyprinidae (*Barilius pakistanicus*, *Barilius vagra*, *Carassius auratus*, *Cyprinus carpio*, *Tor putitora*, *Labeo rohita*, *Labeo diplocheilus*, *Schizothorax plagiostomus*, *Schizothorax esocinus*, and *Schizothorax labiatus*) were identified from a total of 50 fish specimens collected from the study area. Seven morphometric parameters (Total length, fork length, standard length, head length, body depth, eye diameter, and snout length) were statistically analyzed using Excel and SPSS software. Ten species were categorized into four subfamilies within the family Cyprinidae. The two species belonging to the subfamily Cyprininae, three species to the subfamily Danioninae, two species to the subfamily Labeoninae, and three species to the subfamily Barbinae. This study serves as a baseline for future taxonomic studies on ichthyofauna.

Keywords: Fish; Cyprinidae; Panjkora river; Danioninae; Labeoninae.

INTRODUCTION

Fish are cold-blooded animals with lower vertebrae, fins and gills and are mostly dependent on water for their survival. They comprise a variety of species that differ from one another in terms of size, morphology and habitats (Dad et al., 2023). Out of 35,100 fish species included in Fish data base, 13,000 are freshwater species (Froese and Pauly, 2019: Froese, 2010). Class Pisces is divided into three main super classes i.e. Agnatha, Chondrichthyes, and Osteichthyes. Osteichthyes are classified into various orders and families. Family Cyprinidae is the largest family comprising 220 genera and 2400 species (Day et al., 2012; Haseeb et al., 2015). Many cyprinidae fish, such as *Cyprinus carpio, Cirrhinus mrigala, Labeo rohita,* and *Catla catla*, are extensively utilized in aquaculture particularly in Central and Eastern Europe and Asian nations like China, Japan, Bangladesh, India, and Pakistan (Nelson, 2006; Billard, 1999). Morphometric analysis is a valuable method for distinguishing species and identifying and classifying fish (Bagenal, 1978). The study was designed to examine the morphometric parameters of fish species belonging to the family Cyprinidae in the Panjkora river, Khyber Pakhtunkhwa, Pakistan.

MATERIALS AND METHODS

The Panjkora river is located at coordinates 34°39'59.99"N,71°45'59.99E. A total of 50 fish specimens were collected from the Panjkora river, Khyber Pakhtunkhwa, Pakistan.

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The specimens were preserved in 10% formalin for morphometric and meristic parameter analysis (Lowe-McConnel, 1971). The specimens were identified with the help of available Literature and Systematic keys (Talwar & Jhingran, 1991; Jayaram, 1999; Mirza & Sandu, 2007). The morphometric parameters were measured, including Total Length (TL), Standard Length (SL), Forked Length (FL), Head Length (HL), Body Depth (BD), Eye Diameter (ED), and Snout Length (SL), using a scale and digital caliper measured in centimeter (Table 1). The fish were identified and measured for morphometric parameters using morphometric tools. Statistical analysis was performed through Excel and SPSS software (Attaullah et al., 2021).

RESULTS AND DISCUSSION

A total of 50 fish specimens were collected and 10 species were identified (*Barilius pakistanicus*, *Barilius vagra*, *Carassius auratus*, *Cyprinus carpio*, *Tor putitora*, *Labeo rohita*, *Labeo diplocheilus*, *Schizothorax plagiostomus*, *Schizothorax esocinus* and *Schizothorax labiatus*) from the study area (Table 3). The morphometric parameters of the identified species from the Panjkora River, Khyber Pakhtunkhwa, Pakistan (Table 1 & 2). Family Cyprinidae was categorized into four sub-families. The *Carassius auratus* and *Cyprinus carpio* belong to the subfamily Cyprininae. The *Tor putitora*, *Labeo rohita* and *Labeo diplocheilus* belong to the subfamily Danioninae. The *Baralius vagra* and *Baralius pakistanicus* species of subfamily Labeoninae. The reported 3 species (*Schizothorax plagiostomus*, *Schizothorax labiatus* and *Schizothorax esocinus*) belong to subfamily Barbinae (Haseeb et al., 2023; Imran et al., 2024).

The study presents reliable morphometric parameters of ten species significant correlation between morphometric measurement and total length was reported in studies from Jaisamand Lake, Udaipur, India, also from river Chenab, and Panjkora river Pakistan (Naeem et al., 2012; Hasan et al., 2015; Haseeb et al.,2023; Balai et al.,2017). The Cyprinidae was the dominant family represented by eight species (*B. pakistanicus*, *T. putitora*, *C. latius*, *S. plagiostomus*, *G. gotyla*, *P. sophore*, *C. deplocheilus and P. ticto* (Saeed et al., 2013; Hasan et al., 2016; Imran et al., 2024).

Table 1. Morphometric parameters analysis of *Carassius auratus*, *Cyprinus carpio*, *Schizothorax plagiostomus*, *Schizothorax ferocious*, and *Schizothorax labiates* from Panjkora River, Pakistan.

Morphometrics parameters	*Cyprinus carpio* n = 5	*Carassius auratus* n = 5	*Schizothorax labiates* n = 5	*Schizothorax esocinus* n = 5	*Schizothorax plagiostomus* n = 5
	Mean ± S D	Mean ± S D	Mean ± S D	Mean ± S D	Mean ± S D
Total length	35±0.31	10.8±0.5	21.9±0.3	25±0.2	22±0.21
Forked length	30±0.9	10±0.4	19.2±0.21	23±0.23	19±0.23
Standard length	28±0.5	9±0.6	16.7±0.13	20.5±0.2	17.3±0.6
Head Length	7.8±0.7	1.3±0.3	3.8±0.23	3.4±0.8	3.6±0.5
Body depth	10±0.2	3.6±0.8	4.4±0.11	4.2±0.2	4.2±0.4
Eye diameter	1.2±0.12	0.6±0.91	0.79±0.2	0.7±0.12	0.8±0.1
Snout length	1.9±0.2	0.8±0.2	2.3±0.31	2.2±0.11	2.428±0.5

Table 2. Morphometric parameters analysis of *Tor putitora*, *Labeo rohita*, *Labeo diplocheilus*, *Barilius pakistanicus*, and *Barilius vagra* from Panjkora River, Pakistan.

Morphometrics parameters	*Labeo diplocheilus* n = 5	*Labeo rohita* n = 5	*Tor putitora* n =5	*Baralius vagra* n = 5	*Baralius pakistanicus* n = 5
	Mean ± S D	Mean ± S D	Mean ± S D	Mean ± S D	Mean ± S D
Total length	16.8±0.6	14±0.21	18.9±0.2	4.9±0.2	9±0.21
Forked length	15.4±0.8	12.4±0.3	16.8±0.3	4.5±0.3	8±0.23
Standard length	14±0.7	12.7±0.5	15.2±0.12	4.3.5±0.2	7.2.3±0.6
Head Length	3.3±0.21	7.8±0.7	3.3±0.2	1.5±0.21	1.4±0.5
Body depth	4.6±0.6	3.3±0.21	3.5±0.21	0.8±0.14	1.7±0.31
Eye diameter	0.5±0.81	0.8±0.2	0.8±0.2	0.3±0.12	0.5±0.2
Snout length	1.7±0.2	2±0.13	1.4±0.31	0.7±0.11	0.6±0.4

The study includes commercially significant fishes related to the family Cyprinidae, including *S. plagiostomus, S. esocinus, C. carpio, C. auratus*, and *T. Putitora*. Among the commercial fishes, *S. esocinus, T. Putitora*, and *C. carpio* have become exceedingly rare in the Panjkora River due to anthropogenic factors, habitat destruction, and illegal fishing methods (Imran et al., 2024). This recent research is significant for the future diversity of the ichthyofauna.

CONCLUSION

In the present study ten species were categorized into four subfamilies within the family Cyprinidae. The total length along with other morphometric measurements were well correlated, indicating that Panjkora river is suitable for the growth and survival of identified species of the family Cyprinidae. However, the fish fauna of Panjkora River is mostly affected by illegal fishing hunting such as the use of dynamites, electric shock, and overfishing. Proper conservation and management are necessary to protect these fish species.

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