



Morphometric and Meristic Study of Golden Mahseer (*Tor Putitora*) from Jhajjar Stream (JandK), India

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Available online at: www.isca.in

Received 22nd May 2013, revised 25th July 2013, accepted 19th August 2013

Abstract

A study on the morphometric characters and meristic count of Himalayan Mahseer (*Tor putitora*) was conducted in foot hill section of River Chenab (Jammu and Kashmir). Different samples of mahseer were examined for the study of morphometric and meristic count. Some deviations, with regard to a few morphometric parameters and meristic count have been observed that have been duly discussed in the following discussions. Positive correlation has been observed between total length and external body parts. Thus, population appeared to be relatively uniform in all the characters examined, thus following an isometric pattern.

Keywords: *Tor putitora*, meristic count, morphometric characters and isometric growth.

Introduction

Golden mahseer (*Tor putitora*) is the most important commercial fish of Jammu and Kashmir. It is considered an important game fish by anglers¹ and inhabits the montane and submontane regions, streams and rivers in mid hills stretch of Himalayan region.

Identification of a species one of the important and authentic step of research works for identifying a specimen². These measurements include total, standard, body weight and condition factor³. It is also suitable study for recognising the degree of reproductive maturation without sacrificing the animal. Morphometric studies are not only essential to understand the taxonomy but the variation in its features are probably related to the habit and habitat among the variants in this species⁴. The present study is designed with objective to analyse these measurements for *Tor putitora*.

Methodology

Mahseer sampling was done from March 2012 to Feb. 2013 in Jhajjar stream (Tributary of river Chenab) of Jammu. During this period monthly sampling of fishes was carried out with the help of cast net. A total of 60 specimens of mahseer were collected from different sections of Jhajjar stream. The collected fish specimens were preserved in 10% formalin for further studies. All the characters were measured to the nearest millimetres and weighed on electric balance to nearest gram. All counts and measurements are taken following Day⁵ and Jayaram^{6,7,8}. The fishes were categorised into three groups accordingly on the basis of their total length as shown in table 1 and the abbreviation of all the body parameters to be calculated is as given in table-2.

Table-1

Length groups of Mahseer

Length Group	Length (cms)
Length Group I	8cm – 12 cm
Length Group II	12 cm – 16 cm
Length Group III	16 cm – 20 cm

Result and Discussion

A total of 60 specimens ranging from 9.2 cm to 18 cm total length (TL) and 9.9gm to 60 gm body weight (WWPS) were used for morphometric and meristic studies. All the morphometric parameters of *Tor putitora* revealed a proportional increase in total length of fish under study in all three groups as shown in table 3. The morphometric ratio measured among all the three length groups showed isometric growth with increasing body length. A partly change in growth rate was found in MBL of group I GM of Group II and AFB, HD, RBL, MBL, ED, DFB, PFL, VFL and AFB of Group III and is probably because of range effect of grouping. Similar results have been reported by Hazarika *et al.*⁹ in hill trout *Barilius bendelisis* from river Buroi of Assam. Apart, our observations are also in accordance with those made by Zafar *et al.*¹⁰ in *Tor putitora* from foot hill river Korang, Pakistan.

The meristic count including LLS, ALSS, BLSS, PdS, DFR, PFR, VFR, AFR and CFR were counted and are presented in table-4. Since all the parameters are almost constant in all the length groups of fish with different body length, therefore conclude that meristic count is independent of body length. Interestingly, one major meristic character i.e. DFR exhibit a sharp deviation from those recorded by Zafar *et al.*¹⁰ in *Tor putitora* in foot hill river Korang, Pakistan, which in present case has been observed to be [11(2/9)] while the number recorded by the above referred author happen to be [12(4/8)]. Same is the case with LLS in all the three

groups of present study which follows a range of 24-29 where as those reported by Zafar *et al.*¹⁰ in *Tor putitora* in Korang River were reported to be 17.

The relationship between total length and external body parts is studied. A positive correlation (table-5) is found in all parameters except PdL in length group I, AFL of length group II as well HL, ED, PFL, MBL and AFB of length group III showed negative correlation with TL and thus showed significant correlation. The most highly correlated body

parameters in relation to TL are PdL (0.9550) of length group I, SL (0.9722) of length group II and PFB (0.9891) of length group III whereas least correlation for MBL (0.2573) of length group I, ED (0.2433) of length group II and MBL (0.3991) of length group III. The PFL of length group III is highly negatively correlated (0.9816) all the morphometric characters examined, all exhibit a significant positive correlation ($p < 0.001$) which indicate isometric growth in all organs of *Tor putitora* under natural condition.

Table-2
Abbreviations of morphometric and meristic characters

S. No	Body parameters	Abbreviations
1	Weight of preserved specimen	WWPS
2	Total length	TL
3	Fork length	FL
4	Standard length	SL
5	Pre-dorsal length	PdL
6	Pre-pectoral length	PpL
7	Head length	HL
8	Body length	HD
9	Body depth	BD
10	Snout length	SNL
11	Upper jaw length	UJL
12	Lower jaw length	LJL
13	Gape of mouth	GM
14	Rostral barbel length	RBL
15	Maxillary barbel length	MBL
16	Eye diameter	ED
17	Dorsal fin length	DFL
18	Dorsal fin base	DFB
19	Pectoral fin length	PFL
20	Pectoral fin base	PFB
21	Ventral fin length	VFL
22	Ventral fin base	VFB
23	Anal fin length	AFL
24	Anal fin base	AFB
25	Caudal fin length	CFL
26	Caudal fin base	CFB
27	Lateral line scales	LLS
28	Pre-dorsal scales	PdS
29	Above lateral line scales	ALLS
30	Below lateral line scales	BLLS
31	Dorsal fin ray	DFR
32	Pectoral fin ray	PFR
33	Ventral fin ray	VFR
34	Anal fin ray	AFR
35	Caudal fin ray	CFR

Table-3
Morphometric characters of Mahseer (*Tor putitora*)

Measurement (cm)	Length group I			Length group II			Length group III		
	Mean	Median	Standard deviation	Mean	Median	Standard deviation	Mean	Median	Standard deviation
WWPS	12.613	11.05	2.870	28.426	27.05	8.976	50.75	49.5	6.800
TL	10.686	10.75	0.734	13.546	13.5	0.995	16.575	16.15	0.960
FL	9.283	9.45	.698	15.450	11.7	0.966	14.525	14.35	0.928
SL	8.36	8.4	0.664	0.719	10.55	0.905	13.325	13.15	0.842
PdL	4.3	4.4	0.387	5.546	5.5	0.492	6.775	6.75	0.170
PpL	4.393	4.4	0.382	5.646	5.65	0.470	6.925	6.9	0.585
HL	2.503	2.55	0.299	2.880	3.1	0.710	3.675	4	0.939
HD	1.673	1.7	0.183	2.257	2.3	0.299	2.825	2.75	0.189
BD	2.153	2.2	0.185	2.696	2.7	0.299	3.275	3.15	3.359
SNL	0.863	0.9	0.147	1.203	1.3	0.148	1.65	1.55	0.387
UJL	0.683	0.7	0.079	0.216	0.811	0.8	1.2	1.15	0.216
L JL	0.603	0.6	0.115	0.141	0.696	0.7	1	0.95	0.141
GM	0.616	0.6	0.101	0.163	0.8	0.8	1.1	1.1	0.163
RBL	0.765	0.8	0.080	0.842	0.8	0.096	1	1.1	0.2
MBL	0.79	0.8	0.092	0.823	0.8	0.103	1.05	1.05	0.129
ED	0.586	0.6	0.073	0.692	0.7	0.056	0.75	0.75	0.057
DFL	2.186	2.15	0.223	2.7	2.7	0.229	3.3	3.2	0.270
DFB	1.117	1.1	0.098	1.430	1.4	0.193	1.775	1.8	0.05
PFL	1.75	1.7	0.130	2.088	2	0.216	2.4	2.45	0.141
PFB	0.463	0.4	0.076	0.580	0.6	0.063	0.725	0.7	0.05
VFL	1.576	1.6	0.110	1.904	1.85	0.283	2.2	2.2	0.081
VFB	0.513	0.5	0.100	0.611	0.6	0.076	0.65	0.65	0.05
AFL	1.716	1.7	0.064	1.965	1.9	0.244	2.375	2.35	0.095
AFB	0.816	0.6	0.425	0.953	0.8	0.328	1.225	0.95	0.727
CFL	2.343	2.4	0.240	2.838	2.8	0.236	3.3	3.35	0.244
CFB	0.973	1.0	0.117	1.292	1.2	0.135	1.625	1.6	0.15

Table-4
Meristic characters of *Tor putitora*

Meristic characters	Length group I	Length group II	Length group III
Lateral line scales	25-28	24-29	26-27
Pre-dorsal scales	8-10	7-8	8-9
Lateral line transverse scales	3.5/3.5-4.5/2.5	3.5/3.5-4.5/2.5	3.5/3.5-4.5/2.5
Dorsal fin rays	11(2/9)	11(2/9)	11(2/9)
Pectoral fin rays	14-16	14-15	15-16
Ventral fin rays	8-9	8-9	8-9
Anal fin rays	7	7-8	7-8
Caudal fin rays	22-25	23-25	23-25
Fin formula: D11(2/9)P14-16V8-9A7(2/7)Li24-29LITr3.5/3.5-4.5/2.5			

Table-5
Morphometric relationship between total length and other external morphological features

Relationship	Length group I	Length group II	Length group III
TL/WWPS	0.4885	0.6650	0.8407
TL/FL	0.9344	0.9664	0.9501
TL/SL	0.9457	0.9722	0.9530
TL/PdL	0.9550	0.9624	0.9297
TL/PpL	0.9277	0.9587	0.8494
TL/HL	0.6667	0.5941	0.5827
TL/HD	0.6410	0.8430	-0.160
TL/BD	0.7605	0.8567	0.9342
TL/SNL	0.5367	0.5896	0.9722
TL/UJL	0.6483	0.6160	0.9157
TL/LJL	0.3082	0.6011	0.9816
TL/GM	0.5414	0.3797	0.8501
TL/RBL	0.4505	0.4228	0.3991
TL/MBL	0.2573	0.3514	0.2285
TL/ED	0.5813	0.2443	-0.6912
TL/DFL	0.7407	0.8277	0.9483
TL/DBF	0.7427	0.5865	0.3991
TL/PFL	0.6753	0.8360	-0.9816
TL/PFB	0.3714	0.4712	0.9891
TL/VFL	0.6717	0.5847	0.7225
TL/VFB	0.3749	0.2707	-0.5109
TL/AFL	0.5120	0.7437	0.9333
TL/AFB	0.3032	-0.2358	-0.2612
TL/CFL	0.4253	0.4623	0.5242
TL/CFB	0.8403	0.6467	0.8618

Conclusion

The morphometric and meristic counts exhibit isometric pattern and confirmed that the test specimen is *Tor putitora*.

Acknowledgement

The author is thankful to Prof. Seema Langer and Prof. N.K. Tripathi, Department of Zoology, University of Jammu, for providing all the facilities for this study and their guidance.

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