



Length-Weight Relationship and Condition Factor of Tank Goby *Glossogobius giuris* (Hamilton and Buchannan, 1822) from Manchar Lake District Jamshoro, Sindh, Pakistan

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Abstract: *Glossogobius giuris* is a commercial fish and is considered a delicacy and valuable food fish of Pakistan. The fish is widespread in different lakes of Sindh, Pakistan. Fish samples were collected from Manchar Lake District Jamshoro, after super flood of 2010 in Sindh. Total 314 specimens (163 and 151, males and females, respectively) were collected during August 2011 to July 2013 these ranged from 4.8-22 cm in Length (TL) and 2.1- 125.1 g in weight. Length-weight relationship equations were calculated as: $W = -1.483 L^{2.565}$ (combined sexes) $W = -1.466 L^{2.550}$ (males) and $W = -1.517 L^{2.595}$ (females). The relative condition factor (Kn) calculated were, 0.89 -1.10 (Mean 1.0039 ± 0.09), 0.89- 1.11 (Mean 1.0037 ± 0.09) and 0.87 - 1.11 (Mean 1.0043 ± 0.09) for combined, males and females, respectively. The Length-weight relationship showed negative allometric in all groups while relative condition factor suggests satisfactory condition of *G. giuris* in Manchar Lake. This report on length-weight relationships (LWRs) and relative condition factor (Kn) of *G. giuris* from Manchar Lake is first of its kind from Pakistan.

Keywords: *Glossogobius giuris*, Manchar Lake, Condition factor, Pakistan

1. INTRODUCTION

Glossogobius giuris is commonly known as Gullo and belongs to the family Gobiidae. It commonly found in fresh and brackish water bodies of Pakistan, India, Buram and Sri Lanka (Srivastava, 1968; Gandolfi *et al.*, 1991). These are bottom dwellers and burrow in mud (Burton & Burton, 1975). The length-weight relationships (LWRs) of fishes are important in fisheries Science to estimate fish weight (Garcia *et al.*, 1989; Haimovici and Velasco, 2000).

In Pakistan only one species of goby is recorded. It has a high commercial value and fetches high price at fish markets. No any studies on this fish has been undertaken in Pakistan previously, however, detailed research work is undertaken from Bangladesh and India (Raj, 1916; Hora, 1935; Mookerjee, 1944; Mookerjee *et al.*, 1946; Alikunhi *et al.*, 1951; Bhowmich, 1965, Doha, 1974).

The present study therefore, aims to determine the LWRs and Kn of *G. giuris* in Manchar Lake for the first time in Pakistan.

2. MATERIALS AND METHODS

Fish samples comprised of a total 314 specimens (163 males and 151 females), ranging from 4.8 – 22.0 cm (males) to 4.8 – 22.0 cm (females) in Total Length (TL) and weight 2.1-110.7 g males 2.3-125.1 g females

were collected randomly from the catch of fishermen at random at Bubak Main landing center from August 2011 to July 2013. Fishes were dried with the help of towels and weighed on portable electronic compact digital balance (AFD-5000, China). The length measurement of fish samples were made by using measuring tray. The LWRs was determined by using the formula of Le Cren (1951) given as $W = a L^b$

In this equation W stands for total weight (g), a is a coefficient, b is an exponent and L stands for total length of the fish (cm). The values of a and b were determined with the help of linear regression on the renovated equation: $\log W = \log a + b \log L$.

The relative condition factor (Kn) was calculated by using the modified formula of Le Cren's (1951).

$$Kn = W/\hat{W}$$

In the above equation $\hat{W}$ is calculated weight and W is observed weight of the samples. The Kn for all sexes of fish samples (male, female and combined sexes) were calculated separately with 2 cm length intervals.

3. RESULTS AND DISCUSSION

The length-weight relationships of *G. giuris* are shown in (Table 1). The values of a and b for male population were computed as $\log W = -1.466 + 2.550 \log L$ (Fig. 1), while female population $\log$

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$W = -1.517 + 2.595 \log L$ (**Fig. 2**) and combined population were $\log W = -1.483 + 2.565 \log L$ (**Fig. 3**). The sample was divided into 2 cm length groups (**Tables 2, 4**). In present study the value of b in *G. giuris* was less than 3.0 indicating negative allometric growth for male, female and combined sexes. Similar findings in *G. giuris* were reported by Mercy *et al.*, (2008) from Western Ghats of India, where the negative allometry was evident. Joadder, (2009) also reported negative allometric growth in *G. giuris* from Bangladesh with b value 2.768 (males) and 2.667 (females). In small sized fish b value is usually less than 3.0 (personal observation) whereas in large sized fish however, this situation does not prevail, as suggested by Achakzai *et al.*, 2013a, b). He reported

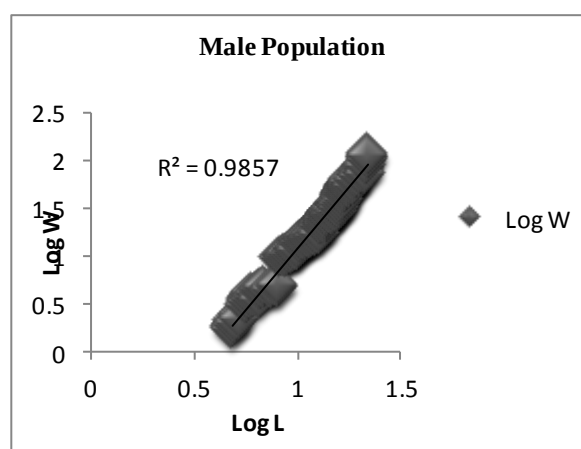


Fig. 1: Plot of values of logarithmic LWR of Male

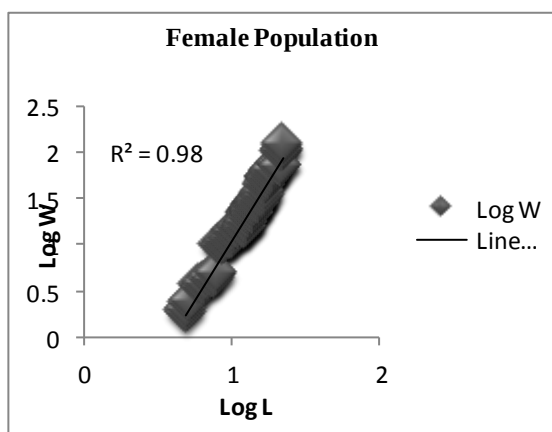


Fig. 2: Plot of values of logarithmic LWR of Female

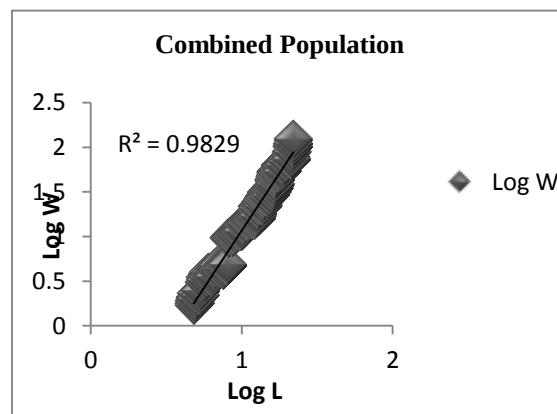


Fig.3: Plot of values of logarithmic LWR of Mixed Population

isometric growth ($b=3.0$) in *Wallago attu* and *Oreochromis mossambicus* from Manchar Lake. Some researchers on the other hand reported positive allometric growth in *G. giuris* with the value of b 3.085 from Chilika Lagoon, Odisha, India (Karna and Panda, 2012). (Alam *et al.*, 2013) also reported positive allometric growth in *G. giuris* with the value of b 3.01, while isometric growth ($b= 3.0$) in the same fish is reported by Hossain *et al.*, (2009) from Bangladesh. This difference can be due to availability of abundant food, less competition and no predation pressure.

Relative condition factor (K_n) for all sexes are shown in table 3. The mean K_n with standard deviation for male ranged from 0.89 to 1.11 (Mean 1.0037 ± 0.09), for female 0.87 to 1.11 (Mean 1.0043 ± 0.09) and for combined population ranged from 0.89 to 1.10 (Mean 1.0031 ± 0.09). The K_n values showed variation in all group sizes. The highest K_n values were noted in small sized fishes, which is similar with Achakzai *et al.*, (2013b) from Manchar Lake Pakistan and Shafi and Quddus (1974) for *Catla catla* and *Cirrhinus mrigala* from Bangladesh. Present studies concluded that the growth of *G. giuris* in Manchar Lake is negative allometric and satisfactory.

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Table 1. Descriptive statistics and estimated parameters of length-weight relationships (LWRs) of *G. giuris* male (M), female (F) and combined sexes (C) and confidence level (CL) during August 2011 to July 2013.

Sex	n	Length range (cm)	Weight range (g)	a	95% CL	b	95% CL	r^2	
M	163	4.8-22	2.1-110.7	0.0342	0.0305	0.0388	2.5490	2.4925	0.986
F	151	4.8-22	2.3-125.1	0.0304	0.0246	0.0336	2.5950	2.5398	0.980
C	314	4.8-22	2.1-125.1	0.0328	0.0294	0.0356	2.5650	2.5215	0.983

Table 2. Length-weight relationships of *G. giuris* in different size groups (2011-12 & 2012-13).

Length Groups (cm)	Male			Female			Combined sexes		
	n	Length(cm) Mean±SD	Mean weigh (g)	n	Length(cm) Mean±SD	Mean weigh (g)	n	Length(cm) Mean±SD	Mean weigh (g)
04.1-06	14	05.4±0.47	2.8	6	05.1±0.41	2.3	20	05.3±0.46	2.6
06.1-08	15	06.9±0.66	4.3	11	07.0±0.64	4.1	26	06.9±0.64	4.2
08.1-10	16	09.2±0.62	10.8	12	09.2±0.61	10.9	28	09.2±0.61	10.8
10.1-12	16	11.0±0.54	15.1	13	11.1±0.68	15.3	29	11.1±0.59	15.2
12.1-14	26	13.3±0.58	22.8	43	13.2±0.60	22.1	69	13.2±0.59	22.3
14.1-16	26	15.1±0.62	31.4	26	15.0±0.53	30.9	52	15.0±0.58	31.1
16.1-18	32	17.1±0.58	50.4	20	17.1±0.54	50.7	52	17.1±0.56	50.5
18.1-20	7	19.4±0.67	66.5	8	18.7±0.61	64.4	15	19.0±0.72	65.2
20.1-22	11	21.4±0.54	94.2	12	21.4±0.47	93	23	21.4±0.49	92.9
Total	163			151			314		

Table 3. Relative condition factor (Kn) for male, female and combined sexes in *G. giuris* at different size groups during August 2011 to July 2013.

Length groups (cm)	Male			Female			Combined sexes		
	Observed weight(g)	Calculated weight(g)	Kn	Observed weight(g)	Calculated weight(g)	Kn	Observed weight(g)	Calculated weight(g)	Kn
04.1-06	5.4	2.54	1.09	2.36	2.12	1.11	5.34	2.40	1.10
06.1-08	6.9	4.81	0.90	4.16	4.77	0.87	6.98	4.80	0.89
08.1-10	9.2	9.84	1.10	10.90	9.75	1.11	9.23	9.81	1.10
10.1-12	11	15.76	0.96	15.36	15.81	0.97	11.1	15.78	0.96
12.1-14	13.3	23.31	0.90	22.17	24.92	0.88	13.29	25.04	0.89
14.1-16	15.1	35.17	0.89	30.90	34.39	0.89	15.1	34.72	0.89
16.1-18	17.1	47.94	1.05	50.78	48.67	1.04	17.15	48.15	1.05
18.1-20	19.4	66.35	1.00	64.46	61.1	1.05	19.08	63.29	1.03
20.1-22	21.4	84.7	1.11	93.00	86.43	1.07	21.42	85.18	1.09
Kn			1.0037			1.0043			1.0039

Table 4. Mean length of length groups and mean weight of length groups of *G. giuris* in different size groups during August 2011 to July 2013.

Length groups cm	Mean Length			Mean Weight		
	Combined	Male	Female	Combined	Male	Female
04.1-06	5.34	5.42	5.13	2.67	2.8	2.37
06.1-08	6.98	6.96	7.02	4.28	4.36	4.16
08.1-10	9.23	9.21	9.24	10.89	10.88	10.91
10.1-12	11.1	11.08	11.13	15.26	15.14	15.37
12.1-14	13.29	13.34	13.26	22.3	22.82	22.18
14.1-16	15.1	15.18	15.02	31.18	31.42	30.91
16.1-18	17.15	17.14	17.17	50.59	50.47	50.78
18.1-20	19.08	19.47	18.74	65.22	66.59	64.46
20.1-22	21.42	21.43	21.42	92.95	94.25	93.01

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