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Relationship between Total Length-Weight, Total Length-Standard Length and Total Length-Scale Length of *Cirrhinus mrigala*

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Abstract: ***The present study was based on relationship between total length-weight, total length-standard length, total length-average total scale length of Cirrhinus mrigala in order to observe the correlation between increase in body and growth of scales in fish. The results of present investigation revealed that positive corelation exist between total length-weight, total length-standard length, total length-average total scale length relationship of Cirrhinus mrigala.***

Keywords: *Cirrhinus mrigala*, total length, standard length, scale length

1. Introduction

Length–weight relationship help in conversion of growth in length equation to growth in weight equation particularly in fishes which is a useful parameter for ichthyologists and fish farmers in assessment culture and stocking of fishes (T.P.Morto. P.Afonso et al.,2001),(O.Ozaydin, E.Taskavak, 2007).Length-length relationship are generally used to assess the influence of food composition changes ,environment changes, rate of spawning in fishes.(Adeyemi S.Olusegun,2011).Length–weight, length-length relationship and condition factor as a quantitative traits of fishes are important tools in fishing biology.(T.S.Imam,U.Bala et al.,2010).One of the earliest observations in regard to the nature of the growth of fish scales was the fact that they increase in size rather than in number to cover the growing fish.(Charles.W.Creaser,1926).Length of fish at the time of previous annulus formation can be calculated from the length of the scales and their annuli (Herman B.Chase,1857).The objective of this study was to determine length-weight, total length-standard length, total length-average total scale length relationship of *Cirrhinus mrigala.*

2. Material Method

A total of 100 fish samples were brought to the fishery laboratory during April-September 2015 and immediately preserved in 5% formalin solution. Weighed using a digital balance to the nearest 0.1gm (Mazaher Zamani Faradonbe et al., 2015).The total length was measured to the nearest 0.1cm from snout to the tip of the tail and standard length was measured from snout to the tip of the caudal peduncle (M.S.Sunil, 2000),(zubia Masood, Rehana Yasmeen Farooq, 2011) using scale.

For studying the relationship between total length-average total scale length, 10 scales were taken from each fish from above the lateral line (Nirmal Thakur, 1966), placed in separate envelope. Venire caliper was used for the measurement of scales. Length of scales was measured from anterior to posterior margin along a vertical imaginary line passing through the center (Narejo.N.T et al., 2015). Statistical analysis was performed with the help of Pearson regression and correlation.

3. Result

The length-weight relationship of *Cirrhinus mrigala* in the form of regression equation was calculated as
Log TL=18.7+0.0325Log WT (Graph 1)

While corelation as 0.919.

When weight was kept on x-axis and total length on y-axis then length-weight relationship (LWR) is found to be significant and highly corelated.

Relationship between total length and standard length was found as
Log TL=3.67+1.06 Log SL (Graph 2)
r =0.966

The corelation coefficient and regression equation relationship was expressed as
Log TL= 3.81+22.3 Log TSL
r=0.974

A linear relationship exists between total length and scale length.

4. Discussion

The length-weight relationship (LWR) is of great importance in fishery to estimate weight from length (S.Llamazares Vegh, I.E. Lozano et al., 2013). The length-weight relationship (LWR) is an important factor in the biological study of fishes and their stock assessment. (K.P. Abdurahiman, T.Hanishnaya et al., 2004). From the length-weight relationship study it is clear that growth of *Cirrhinus mrigala* is positive allomatric in nature. Similar results were found by (Rani Dhanze, J.R.Dhanze, 1997), (V.K.Dubey, U.K.Sarkar et al., 2012), (Dalie Dominic A, N.D. Inasu et al., 2013**), (**B.K.Mahapatra, M.Pal. 2014). The total length standard length relationship exhibit significancant positive corelation. Dalie Dominic A, N.D. Inasu et al., 2013 too

observed positive correlation between total length and standard length in ornamental fish *Etroplus maculatus.* Similar results were also obtained by (Zubia Masood, 2015). The scales increases in size proportionally with the increase in length of fish (Ambreen Kanwal Tehmina Zahid.,et al,2015.(V.R.Desai,N.P.Shrivastava,1990),(Shagufta Saddozai, Zubia Masood et al.,2015) studied total length and scale length of *Cirrhinus mrigala* and found linear relationship between total length and average total scale length. Similar results are reported by (Rahmi Aydin, Metin Calta et al., 2003), (V.Balan, 1965).

5. Conclusion

From total length-weight, total length-standard length relationship it is clear that the growth of *Cirrhinus mrigala* is positive allomatric in nature, it had been also concluded that the correlation between total length-average total scale length relationship was found to be positive.

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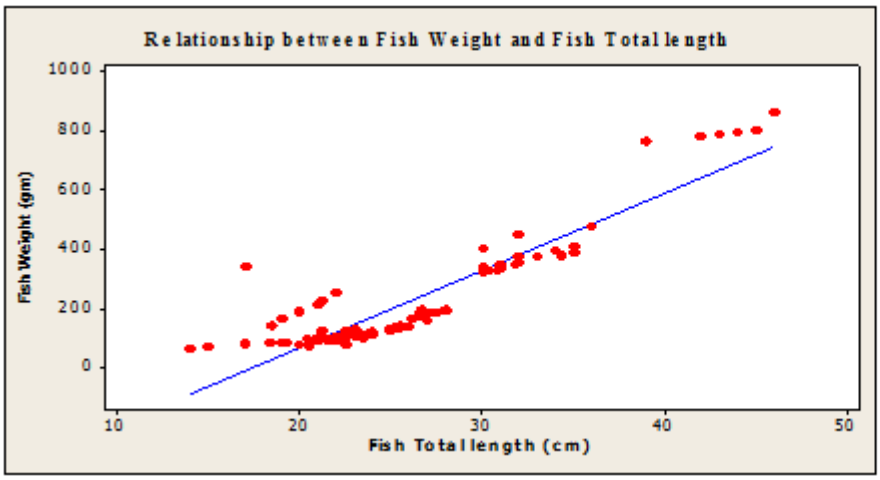
Table 1: Relationship between total length and weight of fish *Cirrhinus mrigala*

Sr No.	Fish Total length (cm)	Fish Weight (gm)	Sr No.	Fish Total length (cm)	Fish Weight (gm)	Sr No.	Fish Total length (cm)	Fish Weight (gm)
1	26.5	180	35	20.5	80	69	25.7	135
2	23.5	95	36	22.5	122	70	24	120
3	27	180	37	20	75	71	23.2	114
4	23.5	112	38	20.5	77	72	22.8	108
5	27	155	39	36	475	73	22	98
6	23	105	40	19	83	74	15	69
7	20.5	70	41	35	410	75	17	82
8	22.5	75	42	30	400	76	14	60
9	22	105	43	22	250	77	19.3	81
10	25.5	140	44	20	190	78	20.4	93
11	23	130	45	32	450	79	21	99
12	24	120	46	18.5	140	80	22.3	105
13	26.2	160	47	19	160	81	26	138
14	26.7	195	48	20	185	82	25	130
15	30	323	49	21.2	223	83	23	111
16	31	347	50	21	209	84	33	370
17	31	335	51	20.8	89	85	34.3	379
18	32	370	52	17.1	340	86	35	388
19	46	860	53	21.2	125	87	31	348
20	21	85	54	27.3	184	88	30	340
21	23.5	106	55	26.5	170	89	45	802
22	21.5	95	56	17	78	90	43	788
23	22.5	103	57	21.3	94	91	39	763
24	21.5	93	58	18.4	82	92	34.3	372
25	25	126	59	25.3	128	93	31.8	346
26	25	123	60	34	394	94	32	352
27	20.5	75	61	32	356	95	30.8	328
28	21	85	62	22.4	100	96	30.4	324
29	22	90	63	25.5	131	97	28	190
30	21.5	92	64	45	800	98	27.5	185
31	22	95	65	42	780	99	24	109
32	22	90	66	44	792	100	25.2	132
33	21	85	67	28	193			
34	21	87	68	27.4	187			

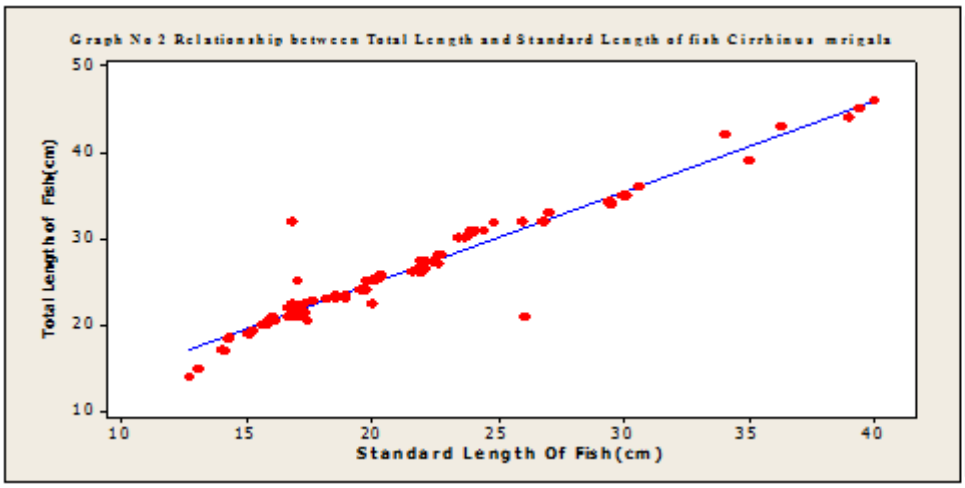


Pearson correlation of fish total length (cm) and fish weight (gm) = 0.919.

The regression equation is
fish total length (cm) = 18.7 + 0.0325 fish weight (gm)

Table 2: Relationship between total length and standard length of fish *Cirrhinus mrigala*

Sr No.	Fish Total length (cm)	Fish Standard length(cm)	Sr No.	Fish Total length (cm)	Fish Standard length (cm)	Sr No.	Fish Total length (cm)	Fish Standard length (cm)
1	26.5	22	35	20.5	17.4	69	25.7	20.3
2	23.5	18.5	36	22.5	16.8	70	24	19.6
3	27	22.6	37	20	15.7	71	23.2	18.9
4	23.5	18.1	38	20.5	16.1	72	22.8	17.6
5	27	18.5	39	36	30.6	73	22	17.1
6	23	22.6	40	19	15	74	15	13
7	20.5	16	41	35	30	75	17	14.1
8	22.5	17.3	42	30	23.4	76	14	12.7
9	22	17.1	43	22	17	77	19.3	15.2
10	25.5	20.3	44	20	15.8	78	20.4	15.8
11	23	18.5	45	32	26.8	79	21	16
12	24	19.5	46	18.5	14.3	80	22.3	17.1
13	26.2	21.6	47	19	15.1	81	26	21.9
14	26.7	21.9	48	20	15.6	82	25	20
15	30	23.4	49	21.2	16.9	83	23	18.5
16	31	23.9	50	21	16.8	84	33	27
17	31	24.1	51	20.8	16.6	85	34.3	29.4
18	32	16.8	52	17.1	14	86	35	30.1
19	46	40	53	21.2	16.9	87	31	24.4
20	21	26.1	54	27.3	22.4	88	30	23.7
21	23.5	18.9	55	26.5	22.1	89	45	39.4
22	21.5	17	56	17	14.1	90	43	36.3
23	22.5	20	57	21.3	16.9	91	39	35
24	21.5	17.3	58	18.4	14.2	92	34.3	29.5
25	25	17	59	25.3	20.1	93	31.8	24.8
26	25	19.8	60	34	29.5	94	32	26
27	20.5	16	61	32	26.9	95	30.8	24.1
28	21	16.7	62	22.4	17.3	96	30.4	23.8
29	22	17.1	63	25.5	20.2	97	28	22.7
30	21.5	16.9	64	45	39.4	98	27.5	21.9
31	22	17.0	65	42	34	99	24	19.8
32	22	16.7	66	44	39	100	25.2	20.1
33	21	16	67	28	22.6			
34	21	17.1	68	27.4	22.2			

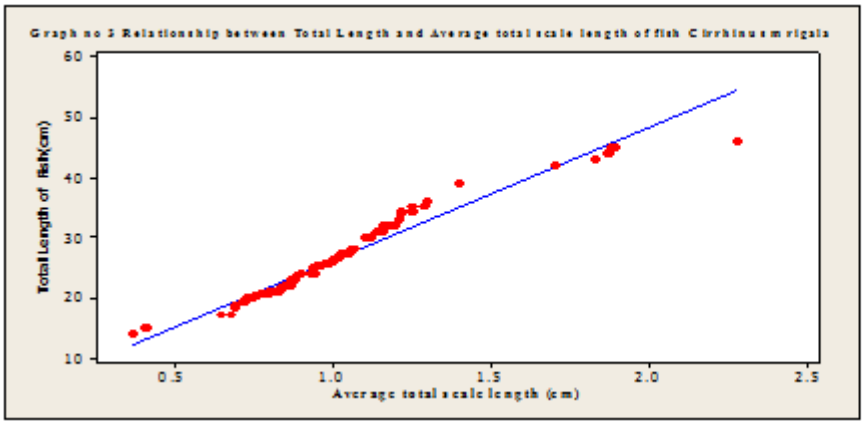


Pearson correlation of total length of fish (cm) and standard length of fish (cm) = 0.966.

The regression equation is
Total length of fish (cm) = 3.67 + 1.06 standard length of fish (cm).

Table 3: Relationship between total length and average total scale length of fish *Cirrhinus mrigala*

Sr No	Fish Total length (cm)	Fish Average Total Scale length (cm)	Sr No.	Fish Total length (cm)	Fish Average Total Scale length (cm)	Sr No.	Fish Total length (cm)	Fish Average Total Scale length (cm)
1	26.5	1.06	35	20.5	0.72	69	25.7	0.99
2	23.5	0.8	36	22.5	0.89	70	24	0.87
3	27	1.14	37	20	0.84	71	23.2	0.85
4	23.5	0.83	38	20.5	0.8	72	22.8	0.73
5	27	1.13	39	36	1.21	73	22	0.69
6	23	0.84	40	19	0.77	74	15	0.41
7	20.5	0.75	41	35	1.29	75	17	0.84
8	22.5	0.8	42	30	1.25	76	14	0.37
9	22	0.69	43	22	1.12	77	19.3	0.87
10	25.5	1	44	20	1.17	78	20.4	1.02
11	23	0.81	45	32	1.4	79	21	0.82
12	24	0.87	46	18.5	0.93	80	22.3	0.89
13	26.2	1.02	47	19	0.87	81	26	0.85
14	26.7	1.07	48	20	0.94	82	25	0.82
15	30	1.12	49	21.2	1.02	83	23	0.79
16	31	1.19	50	21	1	84	33	1.20
17	31	1.16	51	20.8	1.06	85	34.3	1.25
18	32	1.22	52	17.1	0.85	86	35	1.30
19	46	2.28	53	21.2	0.89	87	31	1.02
20	21	0.79	54	27.3	1.17	88	30	1.88
21	23.5	0.87	55	26.5	1.05	89	45	1.83
22	21.5	0.88	56	17	0.83	90	43	1.70
23	22.5	0.87	57	21.3	0.90	91	39	1.03
24	21.5	0.85	58	18.4	0.84	92	34.3	0.94
25	25	0.95	59	25.3	1.0	93	31.8	0.96
26	25	0.94	60	34	1.22	94	32	0.87
27	20.5	0.65	61	32	0.87	95	30.8	0.85
28	21	0.68	62	22.4	1.01	96	30.4	0.83
29	22	0.72	63	25.5	0.98	97	28	0.76
30	21.5	0.75	64	45	1.89	98	27.5	1.1
31	22	0.88	65	42	1.87	99	24	0.80
32	22	0.72	66	44	1.16	100	25.2	0.94
33	21	0.65	67	28	1.14			
34	21	0.88	68	27.4	1.16			



Pearson correlation of total length of fish (cm) and average total scale length (cm)(Avg.) = 0.974

The regression equation is
total length of fish (cm) = 3.81 + 22.3 average total scale length (cm) (Avg.)

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