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The Condition of Ticto Barb (*Puntius ticto*) in the Old Brahmaputra River, Bangladesh

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Abstract: The Ticto Barb (*Puntius ticto*), a member of the Cyprinidae family, is a significant small indigenous freshwater species in Bangladesh, known for its high nutritional value. This study aimed to determine the condition of the fish in the Old Brahmaputra River near Bangladesh Agricultural University, Mymensingh, by calculating the relative condition factor using observed total weight and calculated weight. A total of 1060 specimens, including 557 males and 503 females, were used in the study over a specified period. The relative condition factor was calculated using the equation CF = (a') = BW/SLb and CFBW = BW/BWpred. Results showed that the condition of the fish varied within the month and over the study period. Within a month, the highest condition factor for males was 0.00243 and the lowest was 0.000006, while for females, it was 0.0043 and 0.0000080, respectively. The monthly relative condition factor based on (a') ranged from 0.000039 to 0.000055 for males, 0.000054 to 0.000076 for females and 0.000050 to 0.000070 for both sexes. The monthly relative condition factor based on CFBW ranged from 0.776 to 1.109 for males, 0.904 to 1.260 for females and 0.825 to 1.165 for both sexes, with the lowest appearing in June and the highest appearing in September. Future research should aim to delve deeper into the habitat and population of the Ticto Barb, *Puntius ticto*. In particular, further studies should focus on mapping the distribution of the species, understanding its migration patterns and examining changes in population size over time. Such studies would provide valuable insights into the ecology of Ticto Barb and inform conservation and management efforts.

Key words: *Puntius ticto* · Old Brahmaputra River · Growth

INTRODUCTION

Ticto Barb (*Puntius ticto*), is a species of fish native to Bangladesh, holds great importance in the country for several reasons. Firstly, it is widely cultivated for freshwater aquaculture due to its rapid growth rate, tolerance to poor water quality and high market value [1]. According to a study by Jahan *et al.* [1], Ticto Barb can grow up to 12 cm in length in a span of 6 to 8 months, making it a highly attractive species for aquaculture. This contributes to the development of the aquaculture industry, creating employment opportunities and boosting food production.

Secondly, Ticto Barb serves as a crucial source of protein for many communities in Bangladesh, especially in rural areas where access to other sources of protein may be limited [2]. The cultivation and consumption of this fish play a crucial role in promoting food security and improving access to essential nutrients [2]. A study by Hasan *et al.* [2] found that Ticto Barb is widely consumed in Bangladesh, with a high demand for both live and processed forms of fish.

Thirdly, the cultivation and trade of Ticto Barb have significant economic significance in Bangladesh, particularly in rural areas where other sources of income are scarce [3]. This species provides livelihood

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opportunities for many people, thereby contributing to the local economy and overall well-being of communities [3]. Ahmed *et al.* [3] found that Ticto Barb has a significant impact on the local economy in Bangladesh, with many people relying on its cultivation and trade for their livelihoods.

Finally, Ticto Barb is an important component of Bangladesh's freshwater ecosystem, playing a crucial role in maintaining biodiversity and supporting ecosystem function [4]. The preservation of this species is vital for the long-term health and stability of freshwater ecosystems in the region [4]. According to a study by Hossain *et al.* [4], Ticto Barb is a native species to Bangladesh and plays a key role in maintaining the ecological balance of freshwater ecosystems in the region. Ticto Barb is a species of immense importance in Bangladesh, contributing to the well-being of communities, the environment and the economy. It is crucial to promote and support its cultivation and preservation to ensure its continued significance in the region.

The old Brahmaputra River in Bangladesh is important for the Ticto Barb (*Puntius ticto*) fish species due to the favorable ecological conditions it provides for the species to thrive. The old Brahmaputra river is a large and complex river system that is characterized by its diverse range of habitats and the presence of various microhabitats that support different aquatic species [4]. Ticto Barb, being a native species to Bangladesh, is well-adapted to the conditions in the old Brahmaputra river, where it can find an abundant supply of food and suitable spawning grounds [4]. The river provides a favorable environment for the species to grow and reproduce, thereby maintaining its population in the region [4]. Moreover, the old Brahmaputra river acts as a migration corridor for the Ticto Barb, connecting different habitats and allowing the species to access new habitats and food sources [4]. This plays a crucial role in the survival of the species and helps to maintain its genetic diversity and population stability [4]. In conclusion, the old Brahmaputra river in Bangladesh is important for the Ticto Barb fish species due to the favorable ecological conditions it provides, the abundance of food and suitable spawning grounds and its role as a migration corridor for the species. Therefore, the objective of this study was to compile information on *P. ticto* in the Old Brahmaputra River.

MATERIALS AND METHODS

Population Habitat: The sample was collected from the Old Brahmaputra River near the Bangladesh Agricultural University campus in Mymensingh. This river is one of three major waterways in Bangladesh, with a total length of 2, 900 km. The main channels, known as the Jamuna, flows through Bangladesh, while the old channel, referred to as the old Brahmaputra, originates near Bahadurabad and runs through Mymensingh to the south. At Bhairab, it joins the Meghna. The Old Brahmaputra River is abundant in fisheries biodiversity and serves as a crucial feeding, breeding and nursery ground for various species of fish. Its significance extends to the economy of Bangladesh, making it a significant aspect of the country's ecological and economic landscape.

Collection of Fish Sample: The samples were collected randomly from different places in the river. After the collection of the sample they were kept in the ice box and preserved with 10% neutralized formalin to prevent the decomposition of the fish sample. The detailed collection information of *Puntius ticto* is documented below:

Length and Weight Measurement of the Sample: The fishes which were preserved earlier were washed with tap water to remove slime from the body and to make it formalin free. For the convenience of the measurement of length and weight, the fish body surface was absorbed with tissue paper to remove the moisture and then it was kept at room temperature for about half an hour. The total length was measured from the tip of the snout to the last end of the caudal fin while the standard length was measured from the tip of the snout to the last end of the caudal vertebra. Standard lengths were measured in millimeters with the help of a measuring scale and body weights were measured in grams by using an electric digital balance.

Identification of Sex: The abdomen of each sample was cut with the help of scissors. Then the gonads were collected carefully by using forceps. Digestive organs, viscera, Muscles, fat tissues, etc. were removed properly from the gonad of fish. Then the male and female fishes were identified by observing with the naked eye. The male gonads have a smooth exterior and the female gonads have a rough exterior. Then the gonads were measured in grams by using a digital electric balance.

Table 1: The detailed collection information of ticto barb, *Puntius ticto*

			Size range			Size range	
Sampling Months	Total No. of fish	No. of male	SL[1] (mm)	BW [2] (g)	No. of female	SL[1] (mm)	BW[2] (g)
January	100	51	30 - 49	1.30 – 4.51	49	34 - 65	1.84 -13.97
February	99	50	36 - 65	1.80 – 8.05	50	35 - 68	1.85 - 8.35
March	100	54	30 - 64	1.17 – 6.70	56	39 - 65	2.78 - 11.54
April	100	50	30 - 49	0.99 – 3.9	50	30 - 65	0.97 - 11.10
May	100	50	32 -51	1.10 – 3.70	50	35 - 65	2.01 - 8.90
June	84	32	35 - 4 9	1.66 - 2.95	52	49 - 38	4.01 -1.81
July	73	44	35 - 53	1.47 – 5.43	29	35 - 54	1.40 - 5.91
August	54	38	34 - 56	1.77 - 3.49	16	38 - 50	2.00 - 4.26
September	50	36	24 -53	0.61 -6.55	14	30 - 56	1.02 -6.21
October	100	50	33 - 59	1.36 – 7.04	50	35 - 50	1.89 - 4.39
November	100	53	34 - 57	1.30 - 7.51	47	40 -62	2.80 - 8.67
December	100	50	42 - 59	3.46 -6.38	50	40 - 61	3.20 - 7.87

Here, 1= Standard Length; 2= Body Weight.

Fig. 1: Total length, standard length and weight measurement of *Puntius ticto*

After the identification of sex, only female gonads were preserved with 10% buffer formalin in small vials. The vials are then labeled with a fish number, date and time by using a permanent marker. Thereafter the vials are kept in a box for further work.

Establishment of Length-Weight Relationship: There is a cubic relationship exists between length and weight. The cubic or power curve equation of that relationship is $BW= aSL^b$; here BW=Body weight of fish in (g), SL=Standard length of fish in (mm), a=Co-efficient intercept in the y-axis, b= regression co-efficient indicating growth. But, in a power curve, it is more difficult to calculate. In this case, a straight line can facilitate conducting the analysis and making an inference. By using natural logarithms, this power curve can be transformed into a linear form. The linear equation is Ln BW= Ln a + b (Ln SL). Now it is in the same form as the linear equation Y= a + bX. The values of Ln BW and Ln SL are equal to Y and X respectively. Ln BW is equal to the dependent variable (Y), Ln SL is the independent variable (X) and Ln a and b are the intercept and slope respectively. Thus the data is treated as a linear regression by plotting LnW against LnL. Now, the slope (b) can be calculated by applying the following formula: $b= [n\Sigma XY - \Sigma X\Sigma Y] / [n\Sigma X^2 - (\Sigma X)^2]$ to complete the total calculation it is required to find out the value of intercept (a) and which is calculated by-$a= \bar{Y} - b$. To express the degree of linear association between the two variables, the correlation coefficient (r) is generally calculated. The value of (r) ranges between -1 to 1. The correlation coefficient (r) is, thus, calculated by the following formula $r= [n\Sigma XY - \Sigma X\Sigma Y] / \sqrt{}([n\Sigma X^2 - (\Sigma X)^2] [n\Sigma Y^2 - (\Sigma Y)^2]$.

Calculation of Condition Factor: The study of the condition factor is important for understanding the life cycle of fish species and contributes to the adequate management of these species and, therefore, to the maintenance of equilibrium in the ecosystem. The Condition Factor of an individual fish can be measured by the following formula: $CF= (a') = BW/SL^b$. The more a fish weigh for a given length, the greater will be its condition factor. An alternative is to compare the mean body weight of a fish in a sample with the predicted body weight of a fish. And this forms a generalized equation. The equation for determining the predicted body weight is: $BW_{pred} = a\ SL^b$ In the case of determining relative condition factor monthly values of mean body weight (BW) could be compared with the general predicted value (BW_{pred}). The equation is $CF_{BW} = BW/BW_{pred}$. If the a' value is greater than the (a) value of the length-weight relationship equation, then the health of the fish is plump. If the a' value is smaller than the (a) value of the length-weight relationship equation, then the health of the fish is lean. If the a' value is equal to the (a) value of the length-weight relationship equation, then the health of the fish is ideal.

Statistical Analysis: The analysis of data was performed by using SPSS (Statistical Package for Social Sciences) computer program.

RESULTS

Condition factor has been used as an index of growth and feeding intensity. It also influences the reproductive cycle in fish. The condition factor provides information on the variation of fish physiological status and may be used for comparing populations living in certain feeding, climate and other conditions. Therefore, the condition factor can be used to determine the feeding activity of a species to determine whether it is making good use of its feeding source. In this study, the condition factors of *Puntius ticto* have been determined. And for conducting the analysis a total of 1060 specimens were collected. Among them 557 specimens were males and 503 specimens were females. The males were found to range from 24 mm to 65 mm in standard length and body weight ranged between 0.61g to 8.05 g. And the females were found to range from 30 mm to 68 mm in standard length and body weight ranged between 0.97g to 8.35 g. The sample was collected randomly every month.

Sample-wise monthly condition factors for both sexes, male and female ticto barb were calculated separately in this study. Results are described below according to the population categories of this species. For males, the constants general ‘a’ and general ‘b’ of the length-weight relationship equation for the male population were 0.00005 and 2.9607. The maximum condition factor was obtained in September and the minimum condition factor was obtained in June. Fishes in February, April, September, November and December were plump since the estimated a' value is greater than the general ‘a’ value of the length-weight equation. Individuals in March, May, June, July and August were lean as their a' value is smaller than the general ‘a’ value of the length-weight equation. Fish individuals belonging to January and October showed their health status as ideal because the estimated and general ‘a’ value equations are equal. Detail health status of male fish over the study period was recorded in Table 2.

For female, the constants general ‘a’ and general ‘b’ of length-weight relationship equation for female population were 0.00006 and 2.872. The maximum condition factor was obtained in April and the minimum condition factor was obtained in June. Fishes in the months of January, February, March, April, August, September, October, November and December were plump since the estimated a' value is greater than the general ‘a’ value of the length-weight equation. Individuals in May, June and July were lean as their a' value is smaller than the general ‘a’ value of the length-weight equation. Detail health status of female fish over the study period was recorded in Table 3.

For both sexes, the constants general ‘a’ and general ‘b’ of the length-weight relationship equation for both sex populations were 0.00006 and 2.8954. The maximum condition factor was obtained in September and the minimum condition factor was obtained in June. Fishes in January, February, April, September, October, November and December were plump since the estimated a' value is greater than the general ‘a’ value of the length-weight equation. Individuals in March, May, June, July and August were lean as their a' value is smaller than the general ‘a’ value of the length-weight equation. Detail health status of male fish over the study period was recorded in Table 4.

Sample-wise monthly relative Condition factors for both sexes, male and female ticto barb were calculated separately in this study. Results are described below according to the population categories of this species.

For males, the constants general ‘a’ and general ‘b’ of the length-weight relationship equation for male populations were 0.00005 and 2.9607. The maximum relative condition factor was obtained in September and the minimum relative condition factor was obtained in June. Fishes in January, February, April, September, October, November and December were plump since the calculated BW_{pred} value was smaller than the mean BW value of the length-weight equation. Individuals in March, May, June, July and August were lean as their BW_{pred} value was greater than the mean BW value of the length-weight equation. Detail health status of male fish over the study period was recorded in Table 5.

Table 2: Sample-wise monthly condition factor for the male population

Sample	Mean SL (mm)	Mean BW (g)	General a	General b	a'	Inference
January	37.96	2.38	0.00005	2.9607	0.000050	Ideal
February	52.22	6.39	0.00005	2.9607	0.000052	Plump
March	45.46	3.76	0.00005	2.9607	0.000046	Lean
April	40.52	2.93	0.00005	2.9607	0.000051	Plump
May	39.72	2.27	0.00005	2.9607	0.000042	Lean
June	41.88	2.46	0.00005	2.9607	0.000039	Lean
July	44.36	3.36	0.00005	2.9607	0.000045	Lean
August	41.55	2.75	0.00005	2.9607	0.000044	Lean
September	41.97	3.54	0.00005	2.9607	0.000055	Plump
October	45.30	4.04	0.00005	2.9607	0.000050	Ideal
November	44.57	4.10	0.00005	2.9607	0.000054	Plump
December	48.52	5.20	0.00005	2.9607	0.000053	Plump

Table 3: Sample-wise monthly condition factor for the female population

Sample	Mean SL (mm)	Mean BW (g)	General a	General b	a'	Inference
January	43.92	3.68	0.00006	2.872	0.000070	Plump
February	51.76	6.24	0.00006	2.872	0.000075	Plump
March	54.52	5.94	0.00006	2.872	0.000061	Plump
April	46.08	4.53	0.00006	2.872	0.000076	Plump
May	44.18	3.09	0.00006	2.872	0.000058	Lean
June	42.35	2.55	0.00006	2.872	0.000054	Lean
July	43.00	2.92	0.00006	2.872	0.000059	Lean
August	42.88	3.05	0.00006	2.872	0.000063	Plump
September	41.57	3.31	0.00006	2.872	0.000074	Plump
October	42.68	3.01	0.00006	2.872	0.000063	Plump
November	50.83	5.30	0.00006	2.872	0.000067	Plump
December	50.30	5.63	0.00006	2.872	0.000073	Plump

Table 4: Sample-wise monthly condition factor for both sex populations

Sample	Mean SL (mm)	Mean BW (g)	General a	General b	a'	Inference
January	40.88	3.02	0.00006	2.8954	0.000065	Plump
February	49.67	5.62	0.00006	2.8954	0.000069	Plump
March	49.63	4.76	0.00006	2.8954	0.000059	Lean
April	43.30	3.73	0.00006	2.8954	0.000068	Plump
May	41.95	2.68	0.00006	2.8954	0.000054	Lean
June	42.17	2.51	0.00006	2.8954	0.000050	Lean
July	43.82	3.19	0.00006	2.8954	0.000056	Lean
August	41.94	2.84	0.00006	2.8954	0.000057	Lean
September	41.86	3.47	0.00006	2.8954	0.000070	Plump
October	43.99	3.53	0.00006	2.8954	0.000062	Plump
November	47.51	4.66	0.00006	2.8954	0.000065	Plump
December	49.41	5.42	0.00006	2.8954	0.000068	Plump

Table 5: Sample-wise monthly relative condition factor for the male population

Sample	Mean SL (mm)	Mean BW (g)	General a	General b	BW_{pred}	CF_{BW}	Inference
January	37.96	2.38	0.00005	2.9607	2.37	1.004	Plump
February	52.22	6.39	0.00005	2.9607	6.09	1.048	Plump
March	45.46	3.76	0.00005	2.9607	4.04	0.930	Lean
April	40.52	2.93	0.00005	2.9607	2.88	1.019	Plump
May	39.72	2.27	0.00005	2.9607	2.71	0.837	Lean
June	41.88	2.46	0.00005	2.9607	3.17	0.776	Lean
July	44.36	3.36	0.00005	2.9607	3.76	0.894	Lean
August	41.55	2.75	0.00005	2.9607	3.10	0.888	Lean
September	41.97	3.54	0.00005	2.9607	3.19	1.109	Plump
October	45.30	4.04	0.00005	2.9607	4.00	1.010	Plump
November	44.57	4.10	0.00005	2.9607	3.81	1.075	Plump
December	48.52	5.20	0.00005	2.9607	4.90	1.061	Plump

Table 6: Sample-wise monthly relative condition factor for the female population

Sample	Mean SL (mm)	Mean BW (g)	General a	General b	BW_{pred}	CF_{BW}	Inference
January	43.92	3.68	0.00006	2.872	3.13	1.174	Plump
February	51.76	6.24	0.00006	2.872	5.02	1.243	Plump
March	54.52	5.94	0.00006	2.872	5.83	1.019	Plump
April	46.08	4.53	0.00006	2.872	3.60	1.260	Plump
May	44.18	3.09	0.00006	2.872	3.19	0.970	Lean
June	42.35	2.55	0.00006	2.872	2.82	0.904	Lean
July	43.00	2.92	0.00006	2.872	2.95	0.991	Lean
August	42.88	3.05	0.00006	2.872	2.92	1.043	Plump
September	41.57	3.31	0.00006	2.872	2.67	1.237	Plump
October	42.68	3.01	0.00006	2.872	2.89	1.043	Plump
November	50.83	5.30	0.00006	2.872	4.77	1.112	Plump
December	50.30	5.63	0.00006	2.872	4.62	1.217	Plump

Table 7: Sample-wise monthly relative condition factor for both sex populations.

Sample	Mean SL (mm)	Mean BW (g)	General a	General b	BW_{pred}	CF_{BW}	Inference
January	40.88	3.02	0.00006	2.8954	2.78	1.085	Plump
February	49.67	5.62	0.00006	2.8954	4.89	1.150	Plump
March	49.63	4.76	0.00006	2.8954	4.88	0.976	Lean
April	43.30	3.73	0.00006	2.8954	3.28	1.136	Plump
May	41.95	2.68	0.00006	2.8954	3.00	0.894	Lean
June	42.17	2.51	0.00006	2.8954	3.04	0.825	Lean
July	43.82	3.19	0.00006	2.8954	3.40	0.938	Lean
August	41.94	2.84	0.00006	2.8954	2.99	0.948	Lean
September	41.86	3.47	0.00006	2.8954	2.98	1.165	Plump
October	43.99	3.53	0.00006	2.8954	3.44	1.027	Plump
November	47.51	4.66	0.00006	2.8954	4.30	1.085	Plump
December	49.41	5.42	0.00006	2.8954	4.81	1.126	Plump

For females, the constants general 'a' and general 'b' of the length-weight relationship equation for female populations were 0.00006 and 2.872. The maximum relative condition factor was obtained in April and the minimum relative condition factor was obtained in June. Fishes in January, February, March, April, August, September, October, November and December were plump since the calculated BW_{pred} value is smaller than the mean BW value of the length-weight equation. Individuals in May, June and July were lean as their BW_{pred} value is greater than the mean BW value of the length-weight equation. Detail health status of female fish over the study period was recorded in Table 6.

For both sexes, the constants general 'a' and general 'b' of the length-weight relationship equation for male populations were 0.00006 and 2.8954. The maximum relative condition factor was obtained in September and the minimum relative condition factor was obtained in June. Fishes in January, February, April, September, October, November and December were plump since the calculated BW_{pred} value is smaller than the mean BW value of the length-weight equation. Individuals in March, May, June, July and August were lean as their BW_{pred} value is greater than the mean BW value of the length-weight equation. Detail health status of male fish over the study period was recorded in Table 7.

For males, the condition factor in males was slightly increasing from January to February. Then it decreased in March to slightly increased in April. After that, it gradually decreased in May and remained more or less the same till August. Thereafter, it sharply increased to September and then slightly decreased in October and remained the same approximately till December. Detailed changes in the condition factor of male fishes over the study period were depicted in Figure 2(a).

For females, the condition factor in females was slightly increasing from January to February. Then it sharply decreased in March and then sharply increased in April, then again sharply decreased in May. After that, it remained the same in August where it slightly increased in September. Thereafter, it gradually decreased in October and remained the same till December. Detail changes in the condition factor of female fishes over the study period were depicted in Figure 2(b).

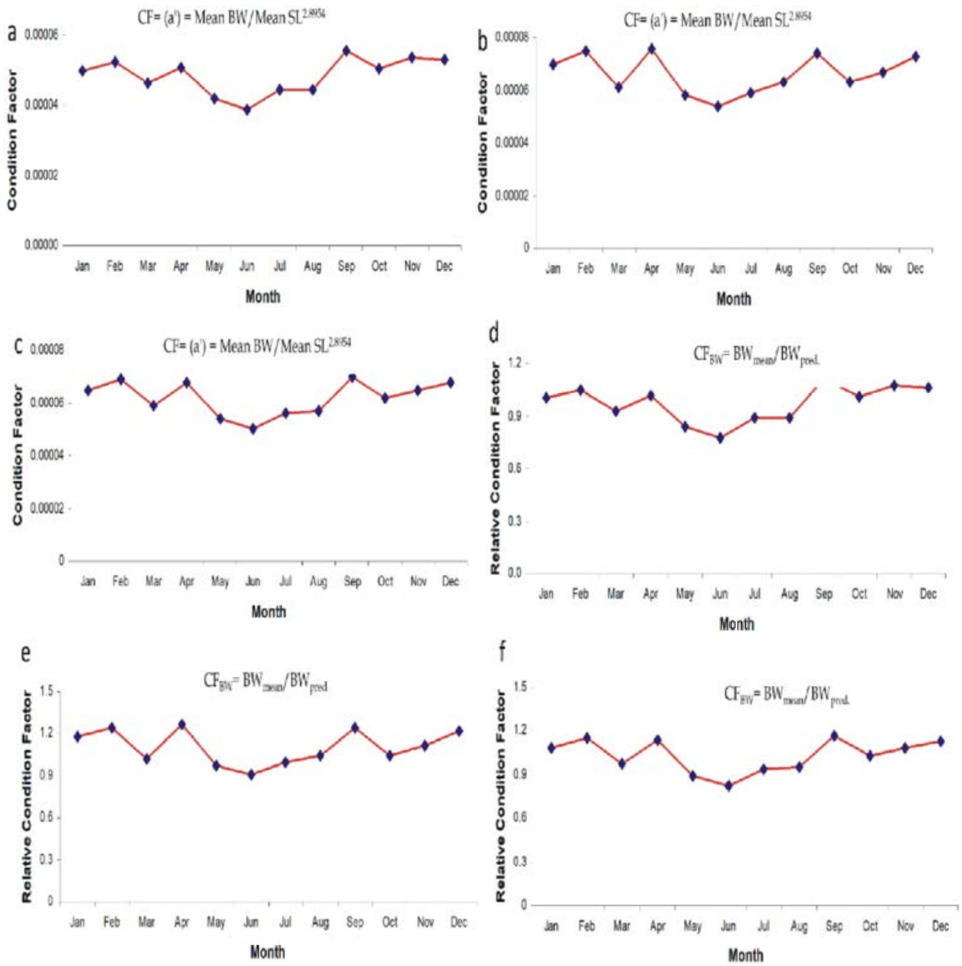

Fig 2 .Monthly changes of relative condition factor.

For both sexes, the condition factor in both sexes fishes was slightly increased from January to February. Then it decreased in March to slightly increased in April. After that, it gradually decreased in May and remained the same till August. Thereafter, it slightly increased in September to slightly decreased in October and then remained the same till December. Detail changes in the condition factor of both sex fishes over the study period were depicted in Figure 2(c).

Monthly Changes of Relative Condition Factor Based on CF_{BW}: For males, the condition factor in males was slightly increasing from January to February. Then it slightly decreased in March to slightly increased in April. After that, it gradually decreased in May and more or less remained the same till August. Thereafter, it sharply increased to September and then slightly decreased in October and remained the same approximately till December. Detail changes in the condition factor of male fishes over the study period were depicted in Figure 2(d).

For females, the condition factor in females was slightly increasing from January to February. Then it sharply decreased in March and then sharply increased in April, then again gradually decreased in May. After that, it remained the same in August where it slightly increased in September. Thereafter, it sharply decreased in October and remained the same till December. Detail changes in the condition factor of female fishes over the study period were depicted in Figure 2(e).

For both sexes, the condition factor in both sexes fishes was slightly increased from January to February. Then it decreased in March to slightly increased in April. After that, it gradually decreased in May and remained the same till August. Thereafter, it slightly increased in September to slightly decreased in October and then remained the same till December. Detail changes in the condition factor of both sex fishes over the study period were depicted in Figure 2(f).

DISCUSSIONS

Condition factor is one of the standard practices in fisheries which is used as an indicator of the variability attributable to the growth coefficient. It expresses the condition of a fish, such as the degree of well-being, relative robustness, plumpness, or fatness in numerical terms. The condition of a fish reflects recent physical and biological circumstances and fluctuates by interaction among feeding conditions, parasitic infections and physiological factors [5]. It is strongly influenced by both biotic and abiotic environmental conditions and can be used as an index to assess the status of the aquatic ecosystem in which fish live. Condition factor also gives information when comparing two populations living in certain feeding, density, climate and other conditions when determining the period of gonad maturation and when following up the degree of feeding activity of a species to verify whether it is making good use of its feeding source [6-10]. The condition factor was determined from observed total weights and calculated weights [11-16].

A summary monthly change in conditions was described for the monthly cycle of ticto barb in the river Old Brahmaputra of Bangladesh Agricultural University campus, Mymensingh, Bangladesh. Here, the individual fish species condition is determined based on the analysis of length-weight data reflecting that the heavier fish at a given length is in better condition hence indicating a Favorable condition. The highest condition factor of 0.00243 was found in males in December and the lowest condition factor of 0.000006 was found in November. It was found that maximum plump male fish individuals were found in the length-class range of 50-60. In some cases, fish may be shown that behavior due to unwanted fat accumulation inside the body or the amount of food they intake. It was also found that maximum lean male fish were found between the length classes of 30-40. Similarly, some fishes maybe showed that behavior due to the disease. There was no ideal male fish found within a month. In the case of females, the highest condition factor of 0.0043 was found in females within November and the lowest condition factor of 0.0000080 was found in July. Moreover, fishes, within a month, fishes in the 60-70 length class were plump than in any other class. In length-class of 30-40, maximum female fish were found ideal showed a perfect combination between length and weight. Some female fishes in the length class of 40-50, 50-60 and 60-70 were found ideal. In the case of both sex fishes, the highest condition factor of 0.00035 was found in March and the lowest condition factor of 0.00009 was found in February. Moreover, within a month, maximum plump fishes were found at 50-60 length class and within October month ideal fishes were found at class ranges of 30-40 and 40-50. The physical condition of fish was good for both sexes within a month. The highest condition factor within length classes over the study period was 0.000065 and the lowest condition factor was 0.000042 for male, female and both sex fishes. The physical condition of male fishes was not good since maximum fishes were found lean except the fishes of length class 20-30 which showed ideal condition. On the other hand, female fish were found heavier and plump. In the case of both sexes, male and female both fishes showed more or less the same condition as an equal number of plump and lean fish were found between them except the fishes at length class of 40-50 which showed ideal condition.

The monthly changes in conditions occurred in both male, female and both sexes populations, which were estimated based on a method applied in this study. Monthly condition factors based on a' the values varied from 0.000039 to 0.000055 for males. The lowest condition factor appeared in June and the highest was in September. The male condition factor slightly increased from January to February. Then it decreased in March to slightly increased in April. After that, it gradually decreased in May and remained more or less the same till August. Thereafter, it sharply increased to September and then slightly decreased in October and remained the same approximately till December. The condition factors for females based on a' the values ranged from 0.000076 to 0.000054. The lowest condition factor appeared in June and the highest condition factor appeared in April for females. The female condition factor slightly increased from January to February. Then it sharply decreased in March and then sharply increased in April, then again sharply decreased in May. After that, it remained the same in August where it slightly increased in September. Thereafter, it gradually decreased in October and remained the same till December. The condition factors for both sex fishes based on a' the values ranged from 0.000070 to 0.000050. The lowest condition factor appeared in June and the highest condition factor appeared in September. For both sex fishes condition factor was slightly increased from January to February. Then it decreased in March to slightly increased in April. After that, it gradually decreased in May and remained the same till August. Thereafter, it slightly increased in September to slightly decreased in October and then remained the same till December.

The monthly changes in relative conditions occurred in both male, female and both sexes populations, which were estimated based on a method applied in this study. Monthly relative condition factors based on CF_{BW} the values varied from 0.776 to 1.109 for males. The lowest condition factor appeared in June and the highest was in September. The male relative condition factor slightly increased from January to February. Then it slightly decreased in March to increase in April. After that, it gradually decreased in May and more or less remained the same till August. Thereafter, it sharply increased to September and then slightly decreased in October and remained the same approximately till December. The relative condition factors for females based on CF_{BW} values ranged from 0.904 to 1.260. The lowest condition factor appeared in June and the highest condition factor appeared in April for females. The female relative condition factor slightly increased from January to February. Then it sharply decreased in March, then sharply increased in April, then gradually decreased in May. After that, it remained the same in August where it slightly increased in September. Thereafter, it sharply decreased in October and remained the same till December. The relative condition factors for both sex fishes based on CF_{BW} values ranged from 0.825 to 1.165. The lowest condition factor appeared in June and the highest condition factor appeared in September. For both sex fishes, the relative condition factor was slightly increasing from January to February. Then it decreased in March to slightly increased in April. After that, it gradually decreased in May and remained the same till August. Thereafter, it slightly increased in September to slightly decreased in October and then remained the same till December.

CONCLUSION

The condition factor of the ticto barb (*Puntius ticto*) reported in this study is a significant contribution to the field of fisheries. It offers valuable insights for research, sustainable fishery management and fish population dynamics modeling in the Old Brahmaputra River. These findings serve as a baseline for future studies, as they represent the first recorded condition factors for this fish species in the Old Brahmaputra River. It is believed that this data will prove useful for further investigations and comparisons.

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