Studies On the Relationship Between Body Length and Haematocrit in Catla catla

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Abstract

The relationship between length and haematocrit in Catla catla - Haematological parameters have been recognized as valuable tools for the monitoring of fish health. Blood directly or indirectly takes part in almost all the physiological activities of fishes and is a good indicator of proper health. The external and internal factors have been found to influence the physiology of the body and their health is closely related with their blood parameters. In this study of Catla catla, we analyse the relationship between haematocrit and body length (fish size) and found that ht value is increased with increasing length. In male Catla catla ht value increased from mean length 23.375 ± 0.4621 to 32.150 ± 0.1842 but decreased in fishes in the mean length 36.650 ± 0.2598 and again increased in the mean length 43.500 ± 0.4330. Male Catla catla showed a higher ht value than females.

Key Words : Haematological parameters, Body length, Sex, Catla catla.

Introduction :

Studies of the haematology and blood biochemistry in different species of fish are of comparative physiological interest. They contribute to a greater understanding of habitat, food selection and mode of life.

A sound knowledge of the length – Weight relationship (LWR) of fishes are important in fishery biology because they allow the estimation of the average weight of the fish of a given length group by establishing a mathematical relation between the two (Beyer 1987). LWR has a number of important applications in fish stock assessment . various studies have been done on the length – weight relationship and food habits of fish species [Mortuza and Rahman 2006, Ayoade and Ikulala 2007, Ayoade et al; 2008, Hosseini et al; 2009, Jud et al; 2010, Lawson 2011]. In the present study the ht value increase with increasing fish size upto a certain length and decreased after that.

Materials and Methods :

Live specimens of the Catla catla were obtained from various ponds such as pond Inai, Rauza pond, Rajendra sarovar and local market in Chapra and transported in aerated containers to the laboratory. The fishes acclimatize to the laboratory conditions for at least 20 days prior to the experiment in a glass aquarium filled with declorinated water. The size of fish varied from 18.00 to 47.75 cm length and 100 to 1500 gm in weight. Both sexes were used.

The blood samples obtained from the coudal circulation with the aid of a heparinised 2 cm^3 disposable plastic syringe and a 21 gauge disposable hypodermic needle.

Haematocrit (Ht/PCV) was determined by microhaematocrit centrifugation technique.

The haematocrit value or the packed cell volume were estimated by centrifuging it for 5 minutes at 10,000 rotation per minute (rpm).

Differences in haematological parameters between male and female fish were statistically analyzed by student's t – test.

Observations :

Table – 1

Total length and blood haematocrit value of male Catla catla; BL. Body length groups (in cm); N. No. of fishes; ML. Mean length (in cm ± SE);
Ht. Haematocrit value (% ± SE).

BL	N	ML	Ht
18.50 – 28.25	40	23.375 ± 0.4621	35.106 ± 0.1514
28.25 – 30.20	40	29.225 ± 0.0924	39.354 ± 0.1922
30.20 – 34.00	40	32.150 ± 0.1842	41.693 ± 0.0663
34.10 – 39.20	35	36.650 ± 0.2598	35.454 ± 0.4623
39.25 – 47.75	35	43.500 ± 0.4330	38.323 ± 0.4557

Table – 2

Total length and blood haematocrit value of female Catla catla; BL Body length groups (in cm); N. No. of fishes; ML. Mean length (in cm ± SE); Ht. Haematocrit value (% ± SE).

BL	N	ML	Ht
18.00 – 27.75	40	22.875 ± 0.4621	33.768 ± 0.1811
27.75 – 29.70	40	28.725 ± 0.0924	38.006 ± 0.2403
29.70 – 33.60	40	31.650 ± 0.1848	40.225 ± 0.0462
33.60 – 38.70	35	36.150 ± 0.2598	33.920 ± 0.3270
38.75 – 47.25	35	43.000 ± 0.4330	37.201 ± 0.3640

Table – 3

Blood haematocrit value of Catla catla of different sexes and different body length groups: BL. Body length groups (in cm.); Ht. Haematocrit value (% ± SE); N. Number of fishes; M. Male; F. female.

BL	N		Ht		t.test	P	df
	M	F	M	F			
18.00 – 27.75	40	40	35.106 ± 0.1514	33.768 ± 0.1811	5.6720	< 0.05	76
27.75 – 30.20	40	40	39.354 ± 0.1922	38.006 ± 0.2403	4.3800	< 0.05	74
30.20 – 34.00	40	40	41.693 ± 0.0663	40.225 ± 0.0462	18.1657	< 0.05	70
34.00 – 39.20	35	35	35.454 ± 0.4623	33.920 ± 0.3270	2.7084	< 0.05	61
39.20 – 47.75	35	35	38.323 ± 0.4557	37.201 ± 0.3640	1.9228	< 0.05	65

Results & Discussions :

In the present study the haematocrit value in male Catla catla in different length groups viz., 18.50 – 28.25 cm, 28.25 – 30.20cm, 30.20 – 34.00 cm, 34.10 – 39.20 cm, 39.25 – 47.75 cm. were found to be 35.106 ± 0.1514, 39.354 ± 0.1922, 41.693 ± 0.0663, 35.454 ± 0.4623, 38.323 ± 0.4557 respectively (table – 1).

The haematocrit value in female Catla catla in different length groups viz., 18.00 – 27.75 cm, 27.75 – 29.70 cm, 29.70 – 33.60 cm, 33.60 – 38.70 cm, 38.75 – 47.25 cm were found to be 33.768 ± 0.1811, 38.006 ± 0.2403, 40.225 ± 0.0462, 33.920 ± 0.3270, 37.201 ± 0.3640 respectively (Table – 2).

The haematocrit value increased with increasing length. In male Catla catla haematocrit value increased from mean length 23.375 ± 0.4621 to 32. 150 ± 0.1842 but decreased in fishes in the mean length 36.650 ± 0.2598 and again increased in the mean length 43.500 ± 0.4330.

In female Catla catla the haematocrit value also increased with increasing length. The haematocrit value in female Catla catla increased from mean length 22.875 ± 0.4621 to 31.650 ± 0.1848 but decreased in fishes in the mean length 36.150 ± 0.2598 and again increased in the mean length 43.000 ± 0.4330.

In the present study high haematocrit value in the above mentioned length and weight groups of fish was due to high physical activity. This is in agreement with results from other fish species. Tilapia zilli, Ezzat et al, (1973); Cyprinus carpio, Fourie and Hatting (1976); Cyprinion macrostomus, Al – Mehdi and Khan (1984); Amphiprous cuchia, Banarjee (1986); Barbus xanthoptrus, Hameed et al. (1985); Anguilla anguilla, Johnson et al (1974); Clarius batrachus, Joshi et al (1977); Sarotheriodon mossambica, Chaudhary et al (1986).

Comparative ht value in male and female sex of Catla catla in Table – 3 clearly showed higher ht value in male as compared to females.

The difference in haematocrit value between the two sexes might be genetically determined and also due to the higher metabolic rates of males compared to females. My finding was as per findings of Fouri & Hattingh (1976); Raizada et al (1983); Chaudhary et al. 1986, and Jawed et al, 2004.

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