

# Influence of Seasonal Variations on TEC of *Ctenopharyngodon Idella*

Naseem Ahmad Mansoori

Department of Zoology, Govt. Digvijay P.G. Autonomous College Rajnandgaon (CG) INDIA.

## ABSTRACT

Present investigation was investigating the significant seasonal variations in the number of erythrocyte in the blood of *Ctenopharyngodon idella*. The R.B.Cs counts were affected by endogenous and exogenous factors such as breeding periods, water quality etc. The RBC value rise continuous by up to certain length, weight range, after which there occur a gradual fall. The haematology and blood bio-chemistry of different species of fishes are the great signification. It helps in understanding the variation seen in the blood characteristics of fishes in selection of food and of Life. Haematology research has considerable increased due to the impact of the environmental pollution to indicate the level of harmful effect on animal. Fish haematology and blood chemistry is also an integral part of fishery management. Total count of erythrocyte, differ from species to species. It is also related to sex; age, sexual difference, environment and season.

**Key Words:** - Seasons , Erythrocyte, Haematological parameters and *Ctenopharyngodon idella* .

## INTRODUCTION

*Ctenopharyngodon idella* is an economically valuable and culturally fresh water fish. This came to India from HongKong. Its local name also Grass carp in India. This fish is also found in almost all the ponds and tanks so ever mostly vegetation are found because this is almost exclusively a vegetation are found because this is almost exclusively a vegetarian.

In fish, the constituents of blood are influenced by many factors, many more then in warm blooded, terrestrial animal. The factors like temperature, salinity, Oxygen tension hydrogen, ion concentration of the water affect the respiratory metabolism, and consequently perhaps the blood constituents also. Blood has much important function in animal the most important ones are transport of oxygen and carbon-dioxide, transport of food, transport of waste product, Chemical Co-ordination manintenance of pH, water balance and transport of heat and temperature regulation. Thus haematological studies may be used to indicate the health status of fish as well as the purity of water in a particular environment.

The study of haematology of fish by hail and Gray (1929) have given the concentration of haemoglobin iron in a few teleost and elasmobranch . Vars (1934) reported the values of iron , blood sugar , RBC count and blood volume ,in few fresh water fishes . field (1943) gives cell numbers, cellular volume , hydrogen ion, concentration , blood protein and vitamins for blood of Crap. Young (1949) describes the variations in the blood cell volume of an individual fish.

Studies on the haematology of Indian fishes are comparatively few recently Qayyum (1967) have reported the differential blood cell counts in the three species of Indian major Carps , ( *Labeo rohita*, *Cirrhinus mrigala* and *Catla catla*).

Total count of erythrocyte , differ from species to species . it is also related to sex; age , environment and season . Sexual difference have been reported by some workers in *Labeo rohita* ( Bagichi and Ibrahim 1974) . they have been reported to have higher erythrocyte count in male than the female . According to Mc Knight (1966), blood cell counts in fishes shows some pathological significance.

Seasonal Variation in the blood cell components of the fishes have been reported by various workers , Alonso-Gomez, et.al (2003) reported the number of blood corpuscles in fish in relation to seasonal cycles and starvation . Smirnova (1962) discussed the seasonal changes in the blood of fishes . Seasonal and age related changes in the morphology of blood in fishes was studied by Khan (1977) , Joshi and Tendon , (1977).

A few reports are also available which deal with the characteristics of blood in relation to age . weight sex and environment Agrawal and Srivastava 1976 and Natarajan 1980 , 1981).

In the present investigation haematology of *Ctenopharyngodon idella* , haematological observation on the basis of seasonal variation and the number of erythrocyte in relation to other blood contents, body weight, the influence of environmental factors and to sexual maturation and reproduction.

## MATERIALS & METHODS

**Study Area and Data collection** - The fishes for the present investigation were collected from the fresh water resources, as Kutela Bhata. Fish farm. Selud tank, Maroda tank, Surholi village tank, Khudmura, Deverbija, village tank, of Durg District in the vicinity of Durg district during the period of June to May.

Live and healthy specimen of *Ctenopharyngodon idella* were collected locally from water resources around Durg district through out the year. The fishes were washed with 0.1%  $KMnO_4$  solution to avoid any fungal or dermal infection. They were narcotised by putting the cotton plug soaked with 90% alcohol over the gills. All these fishes after collection of the sample of blood in the field were brought to the laboratory in 10% formalin for their physical measurements and sexual identification (Conroy 1972).

**Haematological analysis** - TEC was made using an improved Neubauer haemocytometer. (Smith, et.al. 1952 and Ezzat et.al. 1974).

D.O. of the water was determined by sodium azide modification of Winkler's method (A.P.H.A, 1985). Determination of DO and Water temperature. Water temperature values were recorded by mercury bulb thermometer.

**Determination of Gonadosomatic index:**

G.S.I was calculated as-  $G.S.I = \frac{\text{Gonad weight}}{\text{Fish weight}} \times 100$  .

**Statistical Analysis:** Statistical analysis was performed with SPSS version 10.0 for windows (SPSS, 1996). Data was presented as Mean  $\pm$  Standard deviation (S.D) of the mean and analyzed by one way analysis of variance.

### OBSERVATIONS

In *Ctenopharyngodon idella* erythrocytes are oval in shape with centrally situated nuclei having considerable space between the nucleus and the cell membrane . Some erythrocytes were also observed elliptical. The shape and outline of the mature erythrocyte were constant in this species. Erythroblast were also seen as oblong or elliptical. During this study the staining behaviour of erythrocyte was marked. They were found basophilic the nucleus took a deep purplish blue stain with bluish black or purplish violet chromatin threads. These findings were studied by using Giemsa stain for measurement of erythrocyte size. It was studied in male and female specimens both , the cell length , cell width, cell diameter, nuclear length , nuclear width, nuclear diameter calculation are tabulated below.

#### *Ctenopharyngodon idella* (Male)

1	Cell length	10.90 ± 0.12 μm
2	Cell width	07.59 ± 0.11 μm
3	Cell diameter	9.24 ± 0.11 μm
4	Nuclear length	4.61 ± 0.20 μm
5	Nuclear width	2.65 ± 0.08 μm
6	Nuclear diameter	3.63 ± 0.14 μm

**The n-c ratio is 1:2.54**

#### *Ctenopharyngodon idella* (female)

1	Cell length	11.26 ± 0.15 μm
2	Cell width	07.40 ± 0.09 μm
3	Cell diameter	9.33 ± 0.12 μm
4	Nuclear length	5.15 ± 0.10 μm
5	Nuclear width	2.71 ± 0.05 μm
6	Nuclear diameter	3.93 ± 0.07 μm

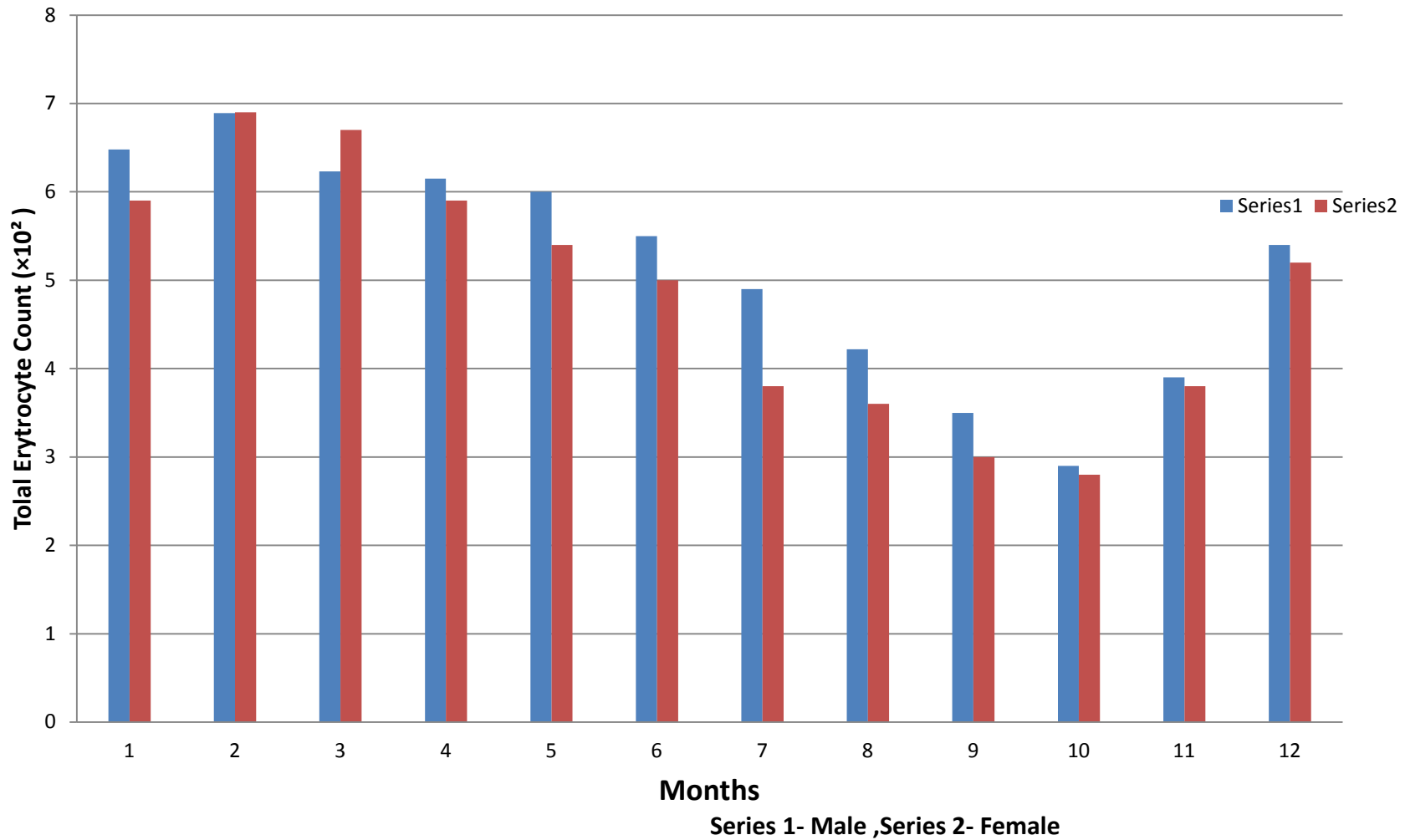
**The n-c ratio is 1:2,3**

**TABLE 1- TOTAL ERYTHROCYTE COUNTS (MULLION/CUBIC MM) IN MALE AND FEMALE *CTRNOPHARYNGODON IDELLA* ( VALENCIENNES) DURING PRE –BREEDING (PB), BREEDING (B) AND POST – BREEDING (POB) PERIOD SHOWING SEASONAL VARIATION.**

S. NO	SESSION	MONTH	MALE		FRMALE	
			MONTHLY VARIATION	SEASONAL VARIATION	MONTHLY VARIATION	SEASONAL VARIATION
1.	SUMMER (PB)	MARCH	6.48 ± 0.10	6.43 ± 0.08 (6.00 – 6.50)	5.90 ± 0.07	6.35 ± 0.01 (5.80 – 7.00)
		APRIL	6.89 ± 0.09		6.90 ± 0.05	
		MAY	6.23 ± 0.05		6.70 ± 0.05	
		JUNE	6.15 ± 0.04		5.90 ± 0.06	
2.	MONSOON (B)	JULY	6.00 ± 0.06	5.15 ± 0.23 (4.15 – 5.70)	5.40 ± 0.05	4.45 ± 0.05 (3.50 – 0.05)
		AUGUST	5.50 ± 0.17		5.00 ± 0.09	
		SEPTEMBER	4.90 ± 0.05		3.80 ± 0.07	
		OCTOBER	4.22 ± 0.13		3.60 ± 0.08	
3.	WINTER (POB)	NOVEMBER	3.50 ± 0.03	(3.92 ± 0.04) (2.70 – 5.60)	3.00 ± 0.03	3.15 ± 0.05 (2.75 – 5.25)
		DECEMBER	2.90 ± 0.03		2.80 ± 0.08	
		JANUARY	3.90 ± 0.05		3.80 ± 0.07	
		FEBRUARY	5.40 ± 0.05		5.20 ± 0.06	

ALL VALUES ARE MEAN ± STANDARD ERROR.  
FOR 8 OBSERVATION 4 MALE AND 4 FEMALE ON EACH MONTH.

**Seasonal variation in total Erythrocyte counts of *Ctenopharyngodon idella***



## RESULT AND DISCUSSION

Fish haematology have been studied in limited sphere various workers who have studied this branch have given their results for the coming workers , After observation , I have also concluded the result of different parameters of *Ctenopharyngodon idella* .

In the present study author has studied the various parameters. In the study of total erythrocyte count it has been found that values increases in both the sexes as the fish reaches to maturity. In male fish the value were 6.00 to 6.50 million /cubic mm and 5.80 to 7.00 millions /cubic mm in female fish in pre-breeding period. which was very nearer to breeding period in breeding period that is the monsoon period goes on the values were 4.15 to 5.70 million /cubic mm in male fish and 3.50 to 5.60 million/cubic mm in female fish . As the post-breeding period goes on the values were 4.15 to 5.70 million /cubic mm in male fish and 3.50 to 5.60 million /cubic mm in female fish. As the post-breeding period commences the TEC values become lowest. They were found 2.70 to 5.60 million / cubic mm in male and 2.75 to 5.25 million /cubic mm in female fish. These findings to author are new investigations so far the haematology and seasonal variation of *Ctenopharyngodon idella* is concerned. Result obtained for this fish suggest a relationship between the number of erythrocytes and their ecological niche.

### DISCUSSION

Total erythrocyte count of fish have been studied by various workers and they have discussed that this parameter indicate the healthy state of a fish if the count and other condition of the cell is normal. Saxena and Chauhan (1994) have reported that the total erythrocyte count was found to be  $2.65 \times 10^6 /\text{mm}^3$  in *Cyprinus carpio* and  $4.50 \times 10^6 /\text{mm}^3$  in *Heteropneustes fossilis*. R.B.C. count unit volume varies widely in individuals of the same species due to variation in seasonal and physiochemical conditions. Banerjee S. and Banerjee, V, (1987) have also reported higher TEC in different Indian species and varying erythrocytes count in fishes depends upon the extent of adaptability to aquatic condition. Smith , Lewis and Kaplan (1952) recorded some degree of inverse correlation between corpuscle size and red cell count in a series of freshwater teleosts and suggesting inverse relationship between total count and size of erythrocytes in slow moving sedentary and benthic species whereas the active, predacious and pelagic species give comparatively higher erythrocyte. Naseem et.al (1970) and Dheer (1988), reported that the increase in erythrocytes of polluted fish could reflect a stimulation of erythropoiesis by elevated metabolic activity or by destruction of gill membranes causing faulty gaseous exchange. There was a positive correlation between the various blood values and degree of sexual maturity and the highest values were found in ripe fishes Alonso-Gomez, et.al. (2003). Ezzat et. al. (1974) found highest erythrocyte counts in August .& High blood values during the breeding season have been reported in *T. zillii*. He also found higher erythrocyte counts in males than in the female than in the females of *Tilapia zillii*. This appears to be related to the activity of the sexes males being more active and also appears to be associated with gonadal activity of the sexes, males being more active and the associated endocrine factors.

In this investigation pointed out that the decrease in the numbers of erythrocytes in fishes during hibernation could be due to lowering of environmental temperature; Oxygen deficiency, nutritional deficiency. And many other factors,

environmental and metabolic, which are directly concerned in the regulation of blood picture.

### Conclusion

From the overview of present investigations, it can be concluded that, the R.B.Cs value were affected by endogenous and exogenous factors such as breeding periods, water quality etc. The RBC value rice continuous by up to certain length, weight range, after which there occur a gradual fall. It is due to the differences in the metabolic demands of the growing and maturing fish. The sexual difference in the number of erythrocytes seem as to be a characteristics feature of some species of fishes. It appears that the gonadeal activities and other associated endocrine factors have some bearing on this sexual difference. This investigation may be helpful for monitoring the health status and related clinical and environmental factors.

### ACKNOWLEDGEMENT

Author thankful to Late Dr. B.N.Sharma Ex-Professor & Principal of Govt. College Vaishalinagar, Bhilai Durg and Dr. Avinash R. Nichat, Asstt. Professor, Govt. College Bhakhara for supervision of this work and encouragements and also Principal and Staff of Govt. V.Y.T. P.G. Autonomouse College Durg (CG) for providing necessary laboratory facility.

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