

# COMPARATIVE HAEMATOLOGICAL STUDY OF TWO FISHES *Cirrhinus mrigala* AND *Wallago attu*

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## Abstract

To study on analysis comparative haematology of two fishes (*Cirrhinus mrigala* and *Wallago attu*). Haematological parameters (RBC, WBC, PCV, MCV, MCH, MCHC) were studied from 5 individual of each species collected from Bhubaneswar 4 No. fish market, Odisha. Mean erythrocytes count obtained for *Cirrhinus mrigala* and *Wallago attu* was  $2.18 \pm 0.29 \times 10^6/\text{mm}^3$ ,  $2.36 \pm 0.36 \times 10^6/\text{mm}^3$  respectively. The mean WBC/Leucocyte count was  $11.50 \pm 1.13 \times 10^3/\text{mm}^3$ ,  $9.71 \pm 1.34 \times 10^3/\text{mm}^3$  respectively. Mean Haemoglobin (Hb) concentration value was  $10.83 \pm 1.21\text{g/dl}$ ,  $10.74 \pm 0.70\text{g/dl}$  respectively. Mean Packed cell volume (PCV) value was  $29.6 \pm 3.13\%$ ,  $28.9 \pm 3.72\%$  respectively. The Mean Corpuscular volume (MCV) value was  $137.69 \pm 22.60\text{fl}$ ,  $124.41 \pm 21.47\text{fl}$  respectively. The Mean corpuscular haemoglobin (MCH) value was  $50.68 \pm 9.64\text{pg}$ ,  $46.37 \pm 7.23\text{pg}$  respectively. The (MCHC) Mean corpuscular haemoglobin concentration value was  $36.52 \pm 7.85\%$ ,  $38.01 \pm 7.10\%$  respectively. This study revealed that the RBC value of the species *Wallago attu* were high in comparison to their normal value. The variation in Haematological parameters is due to environmental and physiological stress.

**Key words-** Haematology, *Cirrhinus mrigala*, *Wallago attu*, comparison, stress.

## Introduction

Hatchings of mrigala normally confine themselves to the surface or sub surface waters. The fry and fingerling tend to move to deeper water. Adult are bottom dweller. It is stenophagous and an illiophage fish in its feeding habit and Mrigal is eurythermal, and is report to tolerate a minimum temperature of  $14^\circ\text{C}$ . In culture condition, the fish usually attains 600grms-700grms in the first year, depending on stocking density and management practices. Among the three Indian major carps, mrigal is normally considered as a slow grower than catla and rohu. As the growth rate reduce after two years the rearing period is usually confined to a maximum of two years, only

Haematological parameters are closely related to the purpose of the animal to the environment, an indication that the environment where fishes live could exert some influence on the haematological characteristics (Gabriel et al 2004).

Body bilaterally symmetrical streamlined its depth about equal to length of head. It is ray-fined fish. Scale is cycloid and present on the whole body except head region. Snout is blunt, often with pores. Mouth broad, transverse, upper lip is entire and not continuous with lower lip, lower most indistinct. One pair of short rostral barbells pharyngeal teeth in three rows. Dorsal fin as high as body with 12 or 13 branches rays.

Comparative Haematology of ten species from Vishakhapatnam Coast was undertaken by Rambhaskar and Rao (1987). They reported that active fishes generally exhibit higher values of erythrocyte number, Haematocrite and Haemoglobin. Electron microscopic studies on the morphology of blood cells of a freshwater Eel, *Amphipinai cuchia* was made by Ahmad et.al (1990) made an exhaustive study on Haematology and blood Biochemical of *Sarotherodon melanotheron*. They on the basis of their studies reported that number of WBC depend on the quality of aquatic environment. Khangarot and Tripathi(1991) opined that the decrease in RBC count because of Haematology usually result in severe Anaemia in most vertebrates including fish species exposed to different pollutants.

*Wallago attu* is a freshwater catfish of the family Siluridae, native to south and Southeast Asia. It is commonly known as helicopter catfish or *wallago* catfish .It found in large river and lakes in two geographical disconnected regions (disjunct distribution), with one population living over much of the Indian Subcontinent and the other in parts of Southeast Asia .The species can reach a total length of 1m (3 ft 3 in).It is locally known as padhin and commonly called *Wallago*. It can reach maximum 2.4 (8 feet) total length. *Wallago attu* has longer anal fin than *W. leerii* with 77-97 with the letter possessing between 64-75 fin rays. The massive mouth and the rows of conical teeth. The mouth gape of *W.attu* reaches beyond the insertion of the eyes *W.leerii* has the mouth only reaching to the beginning of the eyes.

Pandey *et al.* (2003) worked on the biomarkers of oxidative stress: a comparative study of river Yamuna fish , *Wallago attu*.

Maheswaran *et al.*,(2008) had studied the Haematology of *Clarias batrachus* (L.) exposed to mercuric chloride. The mercuric chloride treatment inflicted in the total count of RBC's . The reduction was dosage dependent.

Renuka *et al.*, (2014) studied on haematological parameters of *Catla catla*. The *Lactobacillus* treated fish showed maximum percentage Haemoglobin contents than in there groups. The result suggests that *Lactobacillus acidophilus* could be used effectively as a probiotics for the use in aquaculture.

## Materials and methods

Adult specimen of *Cirrhinus mrigala* and *Wallago attu* used in this study were captured from freshwater pond of Khordha District, Bhubaneswar, Odisha during January, 2020. The collected fish was transported on the same day in container filled with pond water to laboratory and the analyses were carried out. A total of

10 adult specimens from each species were weighed and measure. The fishes were sacrificed and blood samples were collected in EDTA vial.

### Haematological indices

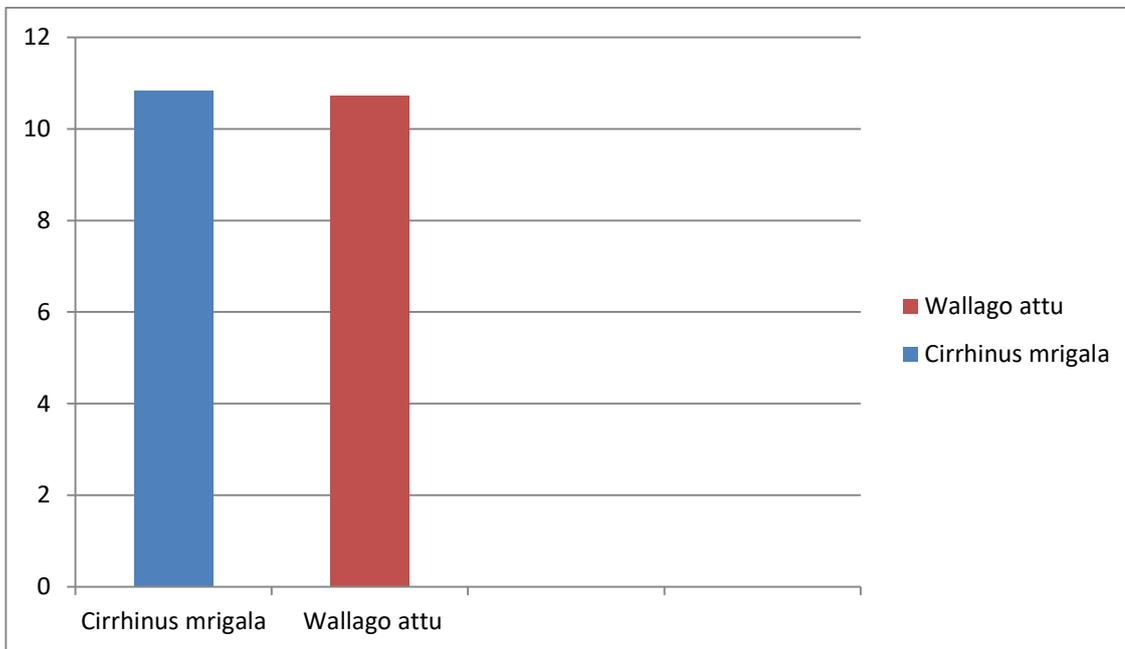
Blood parameters such as haemoglobin test, WBC (white blood cell), RBC (red blood cell), PCV (packed cell volume), MCV (mean cell volume), MCHC (mean corpuscular haemoglobin concentration). These test were examined in our CUTM Zoology laboratory. Haemoglobin estimation is done by Sahli's method using Sahil's haemocytometer. Total RBC are diluted by the help of Hayem's fluid and then observed under the microscope. Total WBC are diluted with Turk's fluid and then it was counted under the microscope. PCV are calculated by taking blood in Wintrob's tube and centrifuged at 3000rpm for 30minutes .In the last MCV and MCHC are calculated.

### Results and Discussions

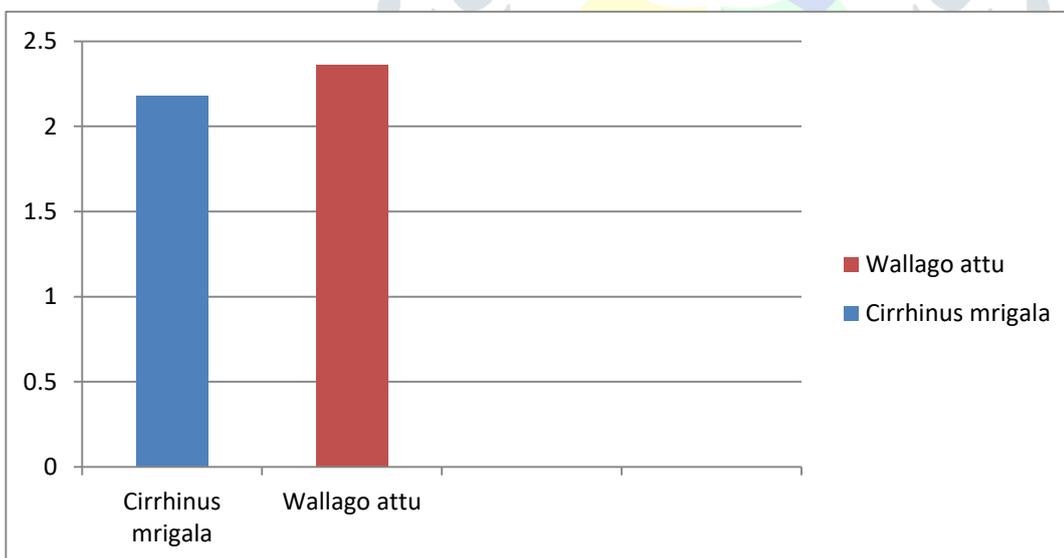
The haematological parameters taken in to study were haemoglobin (Hb), red blood cells(RBCs), white blood cells (WBCs), packed cell volume (PCV), mean corpuscular volume(MCV), mean corpuscular haemoglobin concentration (MCHC), mean corpuscular haemoglobin(MCH).Hb levels were highest in *Cirrhinus mrigala* ( $10.83 \pm 1.21$ ) and *Wallago attu* ( $10.74 \pm 0.70$ ) is lowest. The RBC count was higher in *Wallago attu* and lower in *Cirrhinus mrigala* . The maximum haemoglobin % was ( $10.83 \pm 1.21$ ) in *Cirrhinus mrigala* indicates more active than other species, where as *Wallago attu* have lower value of Hb ( $10.74 \pm 0.70$ ). The WBC count was higher in *Cirrhinus mrigala* ( $11.50 \pm 1.13$ ) and lower in *Wallago attu* ( $9.71 \pm 1.34$ ) .The PCV Value were maximum *Cirrhinus mrigala* ( $29.6 \pm 3.13$ ) where as in other species it was nearly same. The red cell indices: MCV, MCH, MCHC value were calculated, the minimum MCV values recorded in *Cirrhinus mrigala* ( $137.69 \pm 22.60$ ) and minimum value was observed in *Wallago attu* ( $124.41 \pm 21.47$ ). MCH value was higher in *Cirrhinus mrigala* ( $50.68 \pm 9.64$ ) lower in *Wallago attu* ( $46.37 \pm 7.23$ ). The MCHC value was calculated maximum in *Wallago attu* ( $38.01 \pm 7.10$ ) and minimum value observed in *Cirrhinus mrigala* ( $36.52 \pm 7.85$ ).

Table-1 Comparative hematological parameter recorded during the study period.

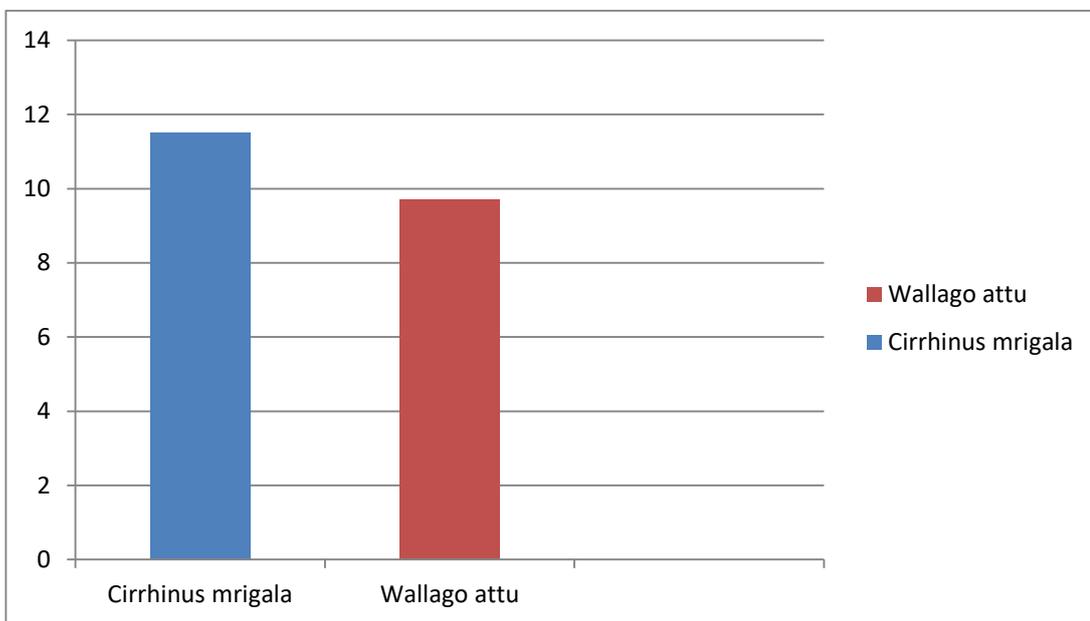
Haematological Parameters	<i>Cirrhinus mrigala</i> X $\pm$ SD	<i>Wallago attu</i> X $\pm$ SD
RBC ( $10^6/\text{mm}^3$ )	$2.18 \pm 0.29$	$2.36 \pm 0.36$
WBC( $10^3/\text{mm}^3$ )	$11.50 \pm 1.13$	$9.71 \pm 1.34$
Hb (g/dl)	$10.83 \pm 1.21$	$10.74 \pm 0.70$
PCV(%)	$29.6 \pm 3.13$	$28.9 \pm 3.72$
MCV(fl)	$137.69 \pm 22.60$	$124.41 \pm 21.47$
MCH(pg)	$50.68 \pm 9.64$	$46.37 \pm 7.23$
MCHC(%)	$36.52 \pm 7.85$	$38.01 \pm 7.10$



### Haemoglobin concentration of *Cirrhinus mrigala* and *Wallago attu*

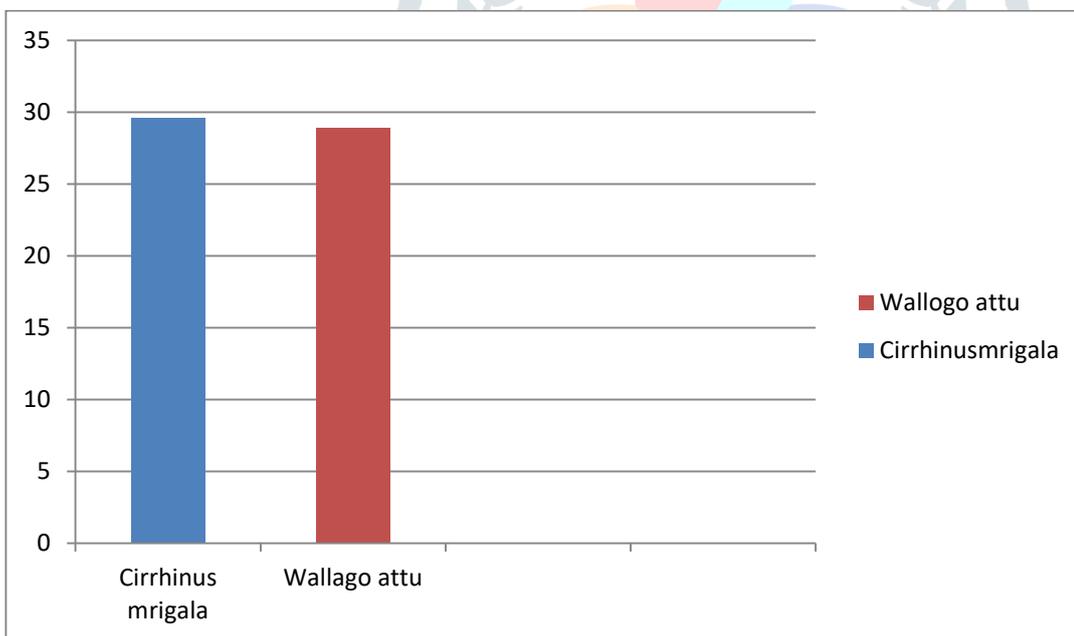


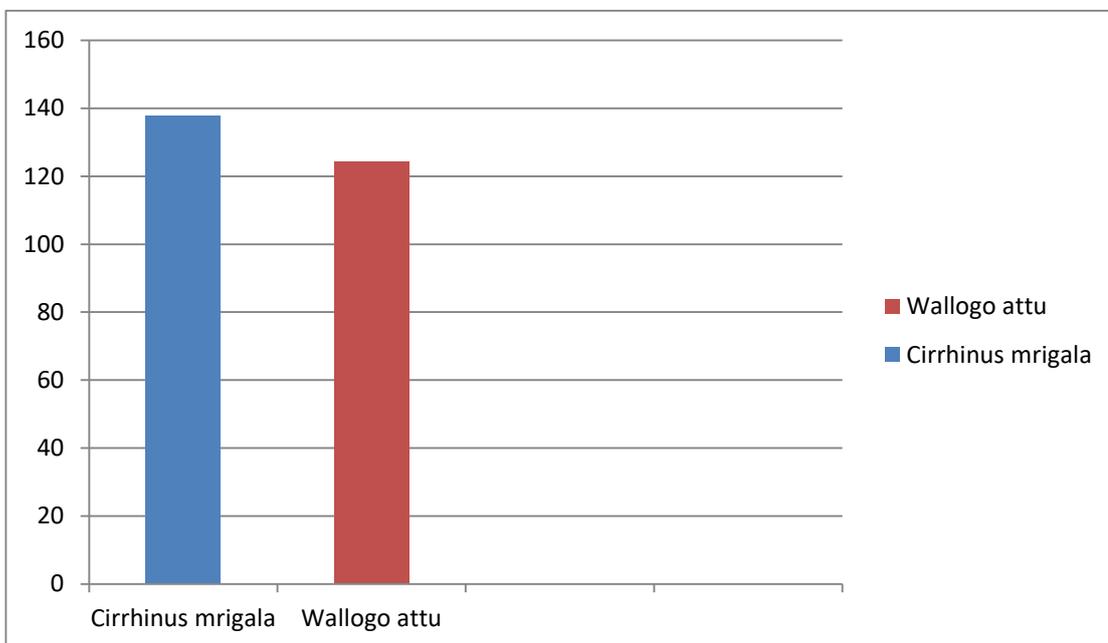
### Red Blood cell of *Cirrhinus mrigala* and *Wallago attu*



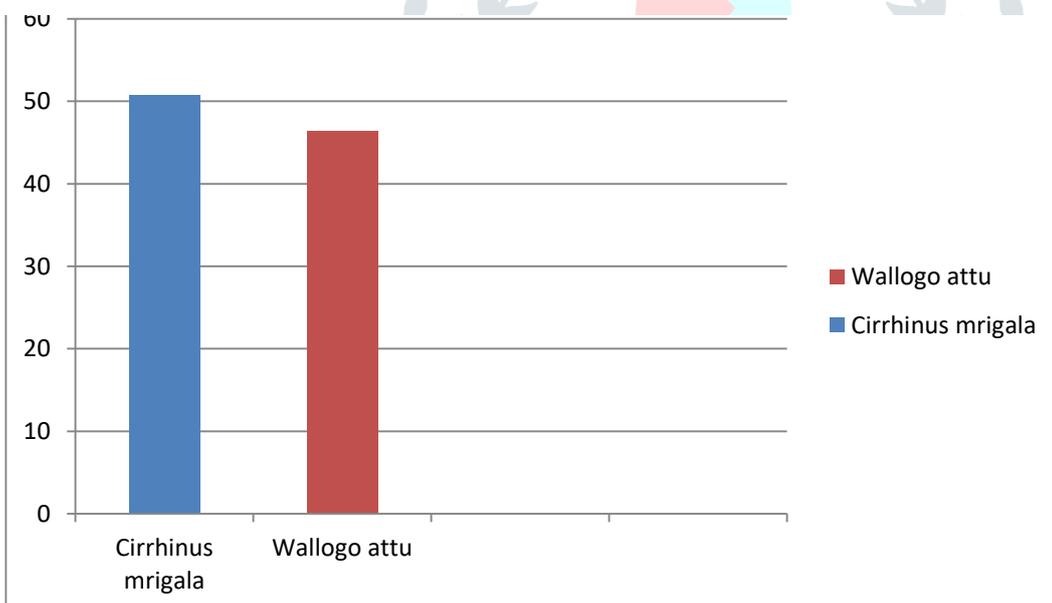
**Fig.3** White blood cells of *Cirrhinus mrigala* and *Wallago attu*

**Fig.4** Packed cell volume of *Cirrhinus mrigala* and *Wallago attu*

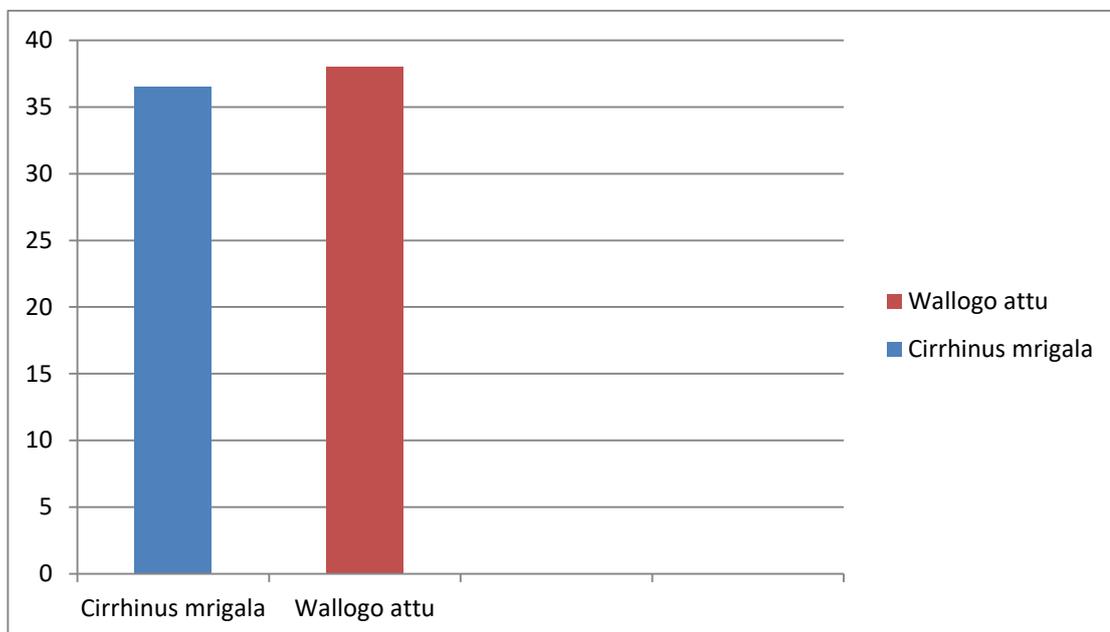




**Fig.5 Mean Corpuscular volume of *Cirrhinus mrigala* and *Wallogo attu***



**Fig.6 Mean Corpuscular haemoglobin of *Cirrhinus mrigala* and *Wallogo attu***



**Fig.7 Mean corpuscular haemoglobin concentration of *Cirrhinus mrigala* and *Wallogo attu***

Southamani *et al.*,(2015) reported haematological responses of Indian 3 major carps (*Labeo rohita*, *Catla catla* and *Cirrhinus mrigala* ). Physicochemical parameters and supplementary feeds improved in Haematological parameters of fingerlings Indian common carp (*Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*) that this can associate with improve health statues and physiological response.

Zorriehzahra *et al.*, (2010) had investigated some Haematological and Biochemical factors like TLC, TEC, PCV, MCV, MCH, MCHC,AST, Total protein plasma, etc of Rainbow trout (*Onchorhynchus mykiss*) fry in West of Mazandaran in Iran.

## Conclusion

In conclusion, the present study showed that, the Haematological analysis indicates that Indian major fishes (*Cirrhinus mrigala* and *Wallogo attu*) were stressed or infected . The haematological parameters like RBC, WBC, Hb, PCV, MCV, MCH, and MCHC could be sensitive to the types of contaminants present in water, because of its close relation with the same aquatic environment and often used to discover the physiological status of animals.

The white blood cell count (WBC), Total red blood cell(RBC), are quantitative evaluation of blood constituents. Haemoglobin concentration (Hb) and packed cell (PCV) are indicators of oxygen conveying valence of blood.

This study of revealed that the RBC value of all the 2 species (*Cirrhinus mrigala* and *Wallogo attu*) were high in comparison to their normal value. But in *Cirrhinus mrigala* high value of WBC indicates about stress condition or infection condition.

## References

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