



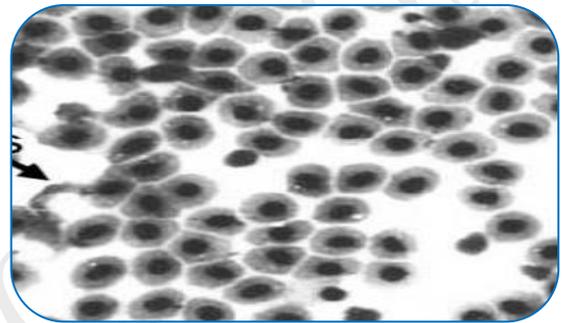
HAEMATOLOGICAL CHANGES IN A HILL STREAM FISH *GARRA GOTYLA GOTYLA* (GRAY) INFECTED WITH *TRYPANOSOMA*

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ABSTRACT :

The paper deals with haematological changes in *Garra gotyla gotyla* infected with *Trypanosoma*. The haematological parameters included Red Blood Corpuscles Count (RBC), White Blood Cells Count (WBC), Haemoglobin (Hb), Differential Leucocyte Count (DLC), Erythrocyte Sedimentation Rate (ESR), Packed Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin Concentration (MCHC) were studied in the infected and normal fish. In the present study, the mean values of RBC, Hb, PCV, MCH, MCHC, thrombocyte, lymphocyte percentage, eosinophil, percentage of infected fish decreased when compared with the healthy fish but the MCV, WBC, ESR and Neutrophil percentage of the infected fish increased when compared with normal fish.



KEYWORDS : *Garra gotyla gotyla*, *Trypanosoma*, Normal and infected fish haematology.

INTRODUCTION:

The freshwater fish inhabiting the streams and rivers are an important source of protein rich food. Since these water bodies are used and exploited for a number of purpose; their water is polluted by many environmental pollutants, which not only degrade the water quality but adversely affect the clean water biota, promoting the growth of harmful bacteria protozoans and metazoans. The intensification of fish culture also produces a number of problems, including the occurrence of fish diseases. The diseases have been one of the major checks in the development of aquaculture. Among these diseases certain bacterial, protozoan and metazoan diseases are responsible for heavy mortality of fishes.

The haematological parameters are an important tool of diagnosis that reveals the state of health of fish. Knowledge of haematology is very important service it deals with the morphology, physiology and biochemistry of blood. Certain blood parameters serve as reliable indicators of fish health as many parasites can live in a host causing damage to it. Haematological analysis can provide valuable knowledge for monitoring the health and condition of fish and are important in diagnosing the structural and functional status of the body.

Trypanosomes affect many vertebrates and invertebrates and were recognised in blood of fish. Fishes act as suitable host for trypanosomes. Approximately 200 species of piscine trypanosomes are on record, however host specificity of a majority of the species is not known.

MATERIALS AND METHODS

Live fishes were collected from Song river, near Lacchiwala. The fishes were brought to laboratory in plastic containers and transferred to glass aquaria for ten days acclimatization. During acclimatization the fishes were feed on usual diet. For all kind of haematological investigation blood was collected from branchial vein using a micro syringe with 23 gauge needle. The fishes were scarified and studies were made on the haematological parameters. Out of these 23 specimens 10 were found trypanosomes. The studies have made on the selected parameters viz. RBC, WBC, Hb, ESR, PCV, MCV, MCH, MCHC and DLC following the standard Method as used Wintrobe (1974), Dacie and Lewis (2001).

RESULTS AND DISCUSSION

RBC was found lowered in diseased fish as compared to the healthy ones. The fall in diseased fish was 28% against the normal healthy fish ($2.80 \pm 22 \times 10^6 / \text{ccm}$). The Haemoglobin content (Hb) were also found depleted by 27.7% in infected fish against the normal fish ($10.6 \pm 1.02 \text{ g } \%$). Table 1 & 2.

Table 1 : Haematological changes in hill stream fish *Garra gotyla gotyla* (Gray). All values are mean \pm S.E. for 20 specimens each.

Parameters	Normal Fish	Infected Fish
RBC x $10^6 / \text{cmm}$	2.80 ± 0.22	1.92 ± 0.20
WBC x cumm	8842.80 ± 12.00	10840.0 ± 210.0
Hb (%)	10.2 ± 1.02	7.2 ± 1.07
ESR (mm/)	1.10 ± 0.35	2.45 ± 0.22
PCV (%)	31.2 ± 2.20	26.0 ± 1.70
MCV (μm^3)	165.0 ± 11.2	202.0 ± 12.0
MCHC (%)	36.2 ± 1.6	26.4 ± 2.00
MCH (pg)	26.4 ± 1.2	20.5 ± 1.20

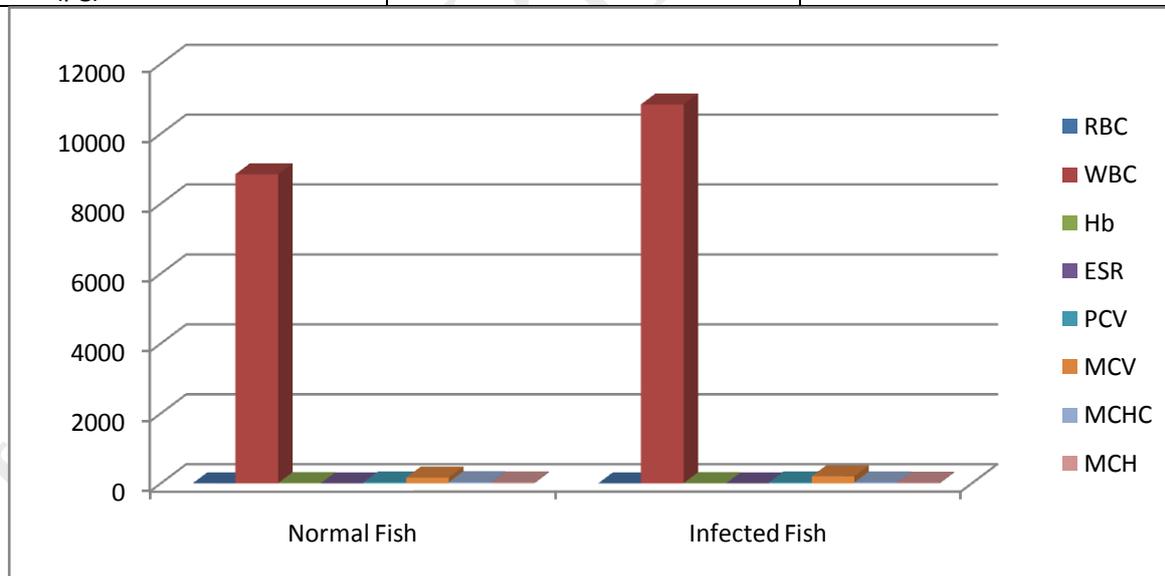
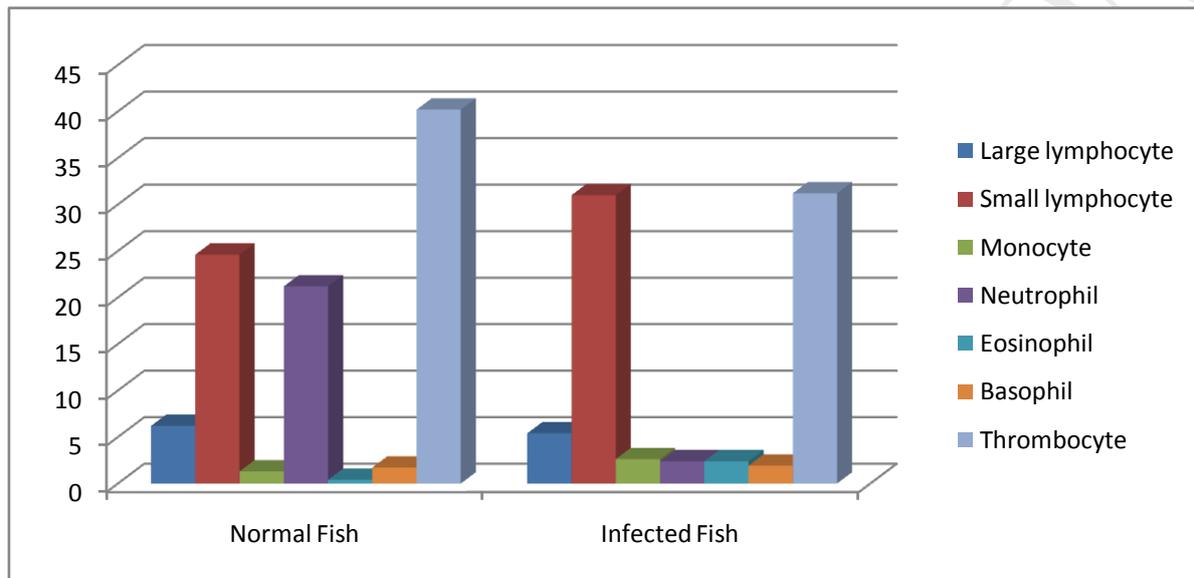


Table 2 : Differential blood cell counts (%)

Parameters	Normal Fish	Infected Fish
Large lymphocyte	6.2 ± 0.50	5.4 ± 1.2
Small lymphocyte	24.61 ± 2.6	31.0 ± 3.0
Monocyte	1.30 ± 0.44	2.62 ± 0.24
Neutrophil	21.2 ± 3.6	2.4 ± 0.2
Eosinophil	0.40 ± 0.2	2.4 ± 0.3
Basophil	1.72 ± 0.5	1.92 ± 0.5
Thrombocyte	40.2 ± 4.2	31.2 ± 4.0



The WBC value was found to have increased under infected by about 16.1% against the normal fish value of $8842.80 \pm 12.0, 10^3/\text{cmm}$, the PCV value also showed a fact about 15.4%. The MCHC was found lower in infected fish as compared to the Normal Fish 20.6%. The MCV value had rise in the infected fish by about 15.6% and ESR value rose by about 50.4% as compared to the healthy fish values. The differential cell counts also revealed conspicuous change. The number of small lymphocytes, basophils and eosinophils increased due to infection, but the number of thrombocytes and neutrophils fall in the infected fishes, as compared to the normal fishes. The number of large lymphocytes, like those the neutrophils also fell by a little margin in infected fish as compared to the normal ones (Table 2). The monocytes were found higher in infected fishes as compared to the healthy fishes. In the present study, the mean values of RBC, Hb, PCV, MCH, MCHC, Thrombocytes, Eosinophil, of the infected fish decreased when compared with the normal fish but the MCV, WBC, Neutrophil percentage, Monocyte of the infected fish increased where compared with normal fish. The decreased haemoglobin trend may be a result the swelling of the RBC as well as poor mobilization of Hb from the spleen to other haemopoietic organs (Gupta and Gupta 2012). The data support the present observations that the significant decrease in RBC and Hb content is possibly due to hypochromic microcytic anaemia caused by trypanosomes. Decreased RCB counts, PCV and Hb content indicate that RBC are being destroyed by the leucocytes activity in an erythrocyte anaemia with subsequent erythroblastosis parasitic infections have been found to destroy erythrocytes and causes anaemia (Ven Brand 1973). Decreased Hb percentage high values of ESR and fall in PCV value is infected fishes in the present study are clear indicators of anaemia. The present study support to Englel and Davis (1964), Smirnova (1971), Tandon and Joshi (1973), Joshi (1979), Joshi (1989), Harikrishanan et.al. (2003), Ranzani et.al. (2005), as many as ten species of freshwater teleosts having haemoflagellate. Trypanosomes in their blood fully revealed that

trypanosomiasis cause definite alterations in various blood component. RBC, Hb and PCV values fall due to these haemoflagellates while the WBC usually rise (Tandon and Joshi 1973) but Joshi and Darbal (1981) reported the WBC value fell sharply and significantly between 60-100% under heavy infection. Kumar et.al. (1984) reported WBC and ESR values are highest in *Schizothorax plagiostomus* severally suffering from black spot disease similarly result found by Gupta and Gupta (1990) following experimental inoculation of trypanosomes in fresh water shark *Wallago attu*, also found severe anaemia 39 days post infection, where TEC had from 2.4 to 1.6 x10⁶/cmm and Hb from 11.4 to 9.0 gm%. Gupta and Gupta (2012) also studied erythropenia in four species of fresh water fishes. The DLC counts also revealed noticeable changes. The small lymphocytes, basophils, monocytes and eosinophils rose in the infected fish while the number of neutrophils and thrombocyte and large lymphocyte fall.

CONCLUSION

The haematological studies have been undertaken to analyse the effect of parasitic on blood parameters. The blood parameters can be considered as a potential bio-indicators in assessing the physiological status of fish and contained in this regards might also provides substantial on the quality of water body as such. The result of present study indicate that parasitic infections in the blood stream of fish promotes their ill effects on various blood parameters the reduction in RBC, PCV and Hb percentage indicates the occurrence of acute anaemia. The infected fishes suggest the destruction of RBC which results in reduced oxygen carrying capacity of fish and ultimately death of fish. The increased ESR and decreased PCV account for degradation of blood proteins in fish. The increase in WBC count can be correlated with a increase in antibody production which help in survival and recovers of the fishes exposed to the parasite infections.

ACKNOWLEDGEMENT

The authors wish to express their sincere thanks to Dr. A. K. Saxena, Principal, D.A.V. (P.G.) College, Dehradun and Dr. R. K. Jauhari, Head, Department of Zoology, D.A.V. (P.G.) College, Dehradun for providing laboratory facility and valuable suggestions.

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