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Research Article

Haematological changes in freshwater fish *Mastacembelus armatus* infected with cestode parasites

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ABSTRACT

The present investigation deals with the haematological changes in freshwater fish *Mastacembelus armatus* infected with cestode parasites *Cicumonco bothrium Sp.* The selected haematological parameters taken were RBC count, WBC count, Hb%, MCV, MCHC, MCH, Differential Leucocyte count. It was observed that some parameters shows significance increase and decrease due to cestode infection.

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1. Introduction

Blood parameters have been studied to determine systematic relationships, elucidate physiological adaptations and assess the health of fishes (Haws and Goodnight, 1962; Blaxhall, 1972; Srivastava, 1968). Haematological studies on fishes have assumed greater significance due to the increasing emphasis on pisciculture and greater awareness of the pollution of natural freshwater resources in tropic. Such techniques have proved valuable for fisheries biologists in assessing environmental health and in monitoring physiological and pathological changes in fish (Iwama et.al., 1976; Chekrabarty and Banerjee., 1988; Mcrcaldo- Allen et.al. 2003; Nespolo and Rosenmann, 2002). Parasitism may induce lower growth (Evans, 1974; Ranzani-Parva and Silva Souza 2004) and haematological alteration (Sopinska, 1985; Yokoyama et. al 1996; Ruane et. al, 2000; Martins et al; 2004). According to Tacher (1981) many parasites can live in a host, sometimes causing damage, sometimes not. Therefore, the changes associated with haematological parameters, due to various parasites establish a data base and allow precise diagnosis guiding the implementation in fish farming and fish industries (Roberts, 1981). Thought recent years the need for establishment of standard normal haematological values with a view to aiding in diagnosis of the state of health and disease in fishes has been duly emphasized by a number of British and American workers viz Hesser (1960), Summerfelt (1967), Blaxhall and Daisley (1973).

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In the tropical countries like India too the Fish Management has occupied an important particularly when the value and usefulness of fish as a cheap source of protein diet have been greatly realized and emphasized. The present investigation deal with changes in haematological parameters in freshwater fish *Mastacembelus armatus* infected with cestode parasites *Circumonco bothrium* Sp.

2. Material and methods

Fish sampling sites

From the month January to June 2020, 105 numbers of freshwater fish *Mastecembelus armatus* (Linnaeus) were collected with body weight (550 ± 0.32)g, length (25 ± 0.12) cm from Paithan, Dist. Aurangabad (M.S) India. The fishes were brought to the laboratory and sacrificed. The alimentary canal of the fish was dissected for examination of cestode parasite. The cestode aparasites were collected and further identified as *Circumoncobothrium* sp.

Blood analysis

The fishes were taken to the laboratory in large containers, were they identified using the key provided by Days, F. (1958). The fish were acclimatized to standard laboratory conditions for seven hours and were subjected to haematological and helminthes parasitic infection.

3. Result and Discussion

Table 1: Mean haematological parameters of *Mastacembelus armatus* (Lacepede) infected with *Circumonco bothrium* Sp.

Haematological parameters		Uninfected fish	Infected fish
Total erythrocyte count – RBC (x 10 ⁶ / mm ³)		2.56 ± 0.089	2.33 ± 0.035
Total leucocyte count – WBC (x 10 ⁴ / mm ³)		1.68 ± 0.076	3.18 ± 0.038
Haemoglobin content – Hb (g %)		11.18 ± 0.052	10.04 ± 0.035
Packed cell volume – Ht (%)		29.67 ± 0.073	30.10 ± 0.016
Erythrocyte Constant	Mean Corpuscular Volume – M.C.V (μ ³)	102.70 ± 19.32	129.21 ± 1.97
	Mean corpuscular Haemoglobin M.C.H(μg)	43.67 ± 1.65	43.10 ± 0.61
	Mean Corpuscular Haemoglobin Concentration – M.C.H.C (%)	37.17 ± 0.18	33.35 ± 0.127
Differential leucocyte Count (DLC)	Lymphocyte %	50.6 ± 0.50	59.6 ± 0.50
	Neutrophil %	33.8 ± 0.37	14.8 ± 0.66
	Basophil %	0.6 ± 0.24	2.2 ± 0.37
	Monocyte %	13.4 ± 0.24	17.4 ± 0.50
	Eosinophil %	1.6 ± 0.24	1.9 ± 0.31

Table 1 shows mean haematological values in infected and uninfected *Mastacembelus armatus* (Lacepede). It was verified that RBC count [healthy (2.56 ± 0.089), infected (2.33 ± 0.035)] showed no significant ($P > 0.05$) changes in the infected fish as compare to the healthy fish, haemoglobin [healthy (11.18 ± 0.052), infected (10.04 ± 0.035)] , hematocrit [healthy (29.67 ± 0.073), infected (30.10 ± 0.016)] , MCHC [healthy (37.17 ± 0.18), infected (33.35 ± 0.127)] were significantly decreased ($P < 0.05$) than those observed in the healthy fish, were as WBC count [healthy (1.68 ± 0.076), infected (3.18 ± 0.038)], MCV [healthy (102.70 ± 19.32), infected (129.21 ± 1.97)] and MCH [healthy (43.67 ± 1.65), infected (43.10 ± 0.61)] values of the healthy fish were lower ($P < 0.05$) than those observed in the infected fish. The percentage of differential leucocyte cell count showed an increase ($P < 0.05$), particularly in lymphocyte [healthy (50.6 ± 0.50), infected (59.6 ± 0.50)], basophil [healthy (0.6 ± 0.24), infected (2.2 ± 0.37)] , monocyte [healthy (13.4 ± 0.24), infected (17.4 ± 0.50)] , eosinophil [healthy (1.6 ± 0.24), infected (1.9 ± 0.31)] and significant decrease in neutrophil [healthy (33.8 ± 0.37), infected (14.8 ± 0.66)] and ($P < 0.05$) in infected fish, in relation to that observed in healthy fish. In the present study freshwater fishes *Mastacembelus armatus* parasitized with cestode had a significant decrease ($P < 0.05$) in RBC count, haemoglobin concentration , packed cell volume (Table I). Similar to the result shown by Radhakrishnan et.al. (1983) were he observed significant reduction in RBC count; haemoglobin content and haematocrit in *Saurida tumbil* (Bloch) infected with *Penetrocephalus ganapatii*. In 1989 Engelherdt et al observed reduction in RBC in Rainbow trout infected with *Proteocephalus neglectus*. The decrease in haemoglobin content under infected conditions has been also observed by Yoshinaga et al (2001) in Japanese flounder infected with *Neo hetetrobothrium hirame*. Abdul Wahid Shah et al (2008) also found reduction in RBC count and haemoglobin % in *Cyprinus* infected with *Brothiocephalus*. Blonar et. al. (2005) confirmed PCV was significantly lower in Artic charr (*Salvelinus alpinus*) infected by larval *D. dentriticum*. PCV can serve as a measure of anemia and oxygen condition (Houston 1997). It also corroborated the findings of Sopinska (1985 in carp parasitized by *Bothriocephalus acheilognathi*. This present finding also confirms to that of Satpute and Agrawal (1974), Sinha and Sircar, Sinha (2000) in *C. batrachus* due to helminth infection. The decrease in RBC count was also observed in *Rita rita* infected with trematode (Agarwal, 1989). The present study have a negative co-relation with result of Martin et al (2004) where there was no difference ($P > 0.05$) in RBC count and haemoglobin in *Leporinus macrocephalus* infected with *Goezia leporine*, but this result was found associated with haematocrit reduction ($P < 0.05$).

4. References

- Agarwal, V and Srivastava, A.K. (1976): Effect of cold shock on blood cells in fresh water tropical teleost *Colisa fasciatus*. *Arah. Anat. Microscop. Morphol. Exptl.*, 63: 165-174.
- Agarwal, (1989): Studies on haematology of trematode infected fresh water fish *Rita rita* (Ham.). *Indian. J. Helminthol*, 41: 51-59.
- Anderson, D and Kolntz, G.W. (1965): Basic Haematology for the fish culturist. *Ann. Northw. Fish Cult. Conf.* 16:38-41.
- Baker, F.J and Silverton, R.E. (1976): Introduction to Medical Laboratory Technology Butterworth London UK pp736.
- Baker, N.F and Douglas, J.R. (1966): Blood alterations in helminth infection. In: E.J.L.n Soulsby (ed.) *Biology of Parasites*, Academic Press, New York.
- Blaxhall, P.C and Daisley, K.W. (1973): Routine haematological methods for use with fish blood. *J.Fish Biol.* 5: 771-781.
- Bondsdroff, B. Von, (1948): Pernicious anemia caused by *Diphyllobothrium latum* in the light of recent investigations. *Bloods*, 3:91-102.