

Research Article

Haematological Changes In Fresh Water Fish, *Channa striatus* Diagnised with the Epizootic Ulcerative Syndrome (EUS)

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ABSTRACT:

Present haematological study deals with determination of EUS infection in fresh water fishes of Warangal district. The three lakes selected for study were Dharmasagar, Hasanparthy and Bhandham. From each lake 100 fishes (*Channa striatus*) of both control and infected were collected for the study. Haematological parameters were estimated in control and infected fishes. Results reveal that in comparison with the control RBC, HB, PCV values in infected fish were decreased by 63.5%, 23%, 55% respectively. Infected fishes had shown an increase in WBC (21%) and MCHC (7.5%) count. Studies also show that MCH and MCV values were found decreased by 8% and 27% in the infected fishes over the control. Differential leucocyte count (DLC) studies in the control fish show that Lymphocytes, Neutrophils, Monocytes, Eosinophils and Basophils values were in the normal percentage range as $52.0 \pm 0.71\%$, $59.6 \pm 0.62\%$, $5.7 \pm 0.34\%$, 2.5 ± 0.37 , $2.3 \pm 0.26\%$ respectively. In case of infected a drastic reduction of (30.7%) in Neutrophils was observed whereas Monocytes (2.3%) and Basophils (0.6%) were not varied much. A noticeable increase of (1.5%) in eosinophil and (5.4%) in lymphocytes was observed in EUS infected fishes. Thus the above results depict the presence of macrocytic anaemia in the infected fishes of Dharmasagar, Hasanparthy and Bhandham Lakes. High pollution, wide range of native fish species, low temperature have led to poor sanitation of the selected lakes which in turn might cause macrocytic anemia in the infected fishes.

Key words: *Channa striatus*, Hematological parameters, *Aphanomyces invadans*, Macrocytic anaemia, EUS

INTRODUCTION

The Epizootic Ulcerative Syndrome (EUS), endemic to South and Southeast Asia, It is a serious disease of fresh water and estuarine fin fish [36]. It is a seasonal epizootic condition characterized by infection of *Aphanomyces invadans* and large hemorrhagic necrotizing ulcers typically producing a granulomatous response [11, [39], [36], [32], [21] and [38] EUS has been reported in fish [8], [19], [33] and [27]. *Aphanomyces invadans* fungi are wide spread in fresh, brakish, eustarine, and marine water [9]. Motile aphenomonads are associated with tail and

causes fin rot hemorrhagic septicemia and epizootic ulcerative syndrome (EUS) in a variety of fresh water and marine fish of the world [30]. As a result of stocking density, ectoparasites, inadequate handling and stressful conditions, out breaks of motile *Aphenomyces* associated diseases can reach epidemic proportions among the aquatic animals, leading to massive mortality rates [18]. Experimental infection studies are important for understanding the infectivity and role of *Aphanomyces invadans* in the etiology of this Epizootic ulcerative condition (EUS)

infection. There are several studies on fish bacterial identification and disease resistance [3], [1] and [7]. The blood constituents of fishes are influenced by various factors like food, temperature and mode of life. Knowledge of haematology is very important since it deals with the morphology, physiology and the biochemistry of fish blood [28]. The haematological parameters are important tools for diagnosis of healthy and infected fishes [29], [24]. The blood analysis also reveals the disease status [2], [6].

Warangal district of Telangana state has many lakes which include Dharmasagar, Hasanparthy and Bhandham lakes. These lakes are with different fishes with abundant *Channa striatus*. *Channa striatus* is the striped murrel with high quality of flesh, and taste. They also have good market value due to low fat, fewer intramuscular spines, and medicinal qualities [16]. The low winter temperature of 25-30^o in this region is ideal for EUS outbreaks which reduced the commercial value of this fish. So, the present study has taken up to study the haematological changes in *Channa straitus* with EUS infection in comparison with healthy control which can promote control measures in future.

MATERIALS AND METHODS

Control and infected *Channa straitus* with EUS of 100 fishes were collected irrespective of norms such as age, sex and size from Dharmasagar, Hasanparthy and Bhandham lakes which are located at a distance of 30 Km from Kakatiya university campus during the rainy and winter seasons between July, 2012 to February, 2013.

Statistical Analysis:

The results are obtained from SPSS (12.0) Windows Version. Each assay was replicated 5 times. Values were expressed in Mean \pm SD of replication at $p < 0.0001$ for infected (T) and control (C) fishes.

RESULTS AND DISCUSSION

The haematological study has become an essential tool for fishery research. It has been reported that

the blood values remarkably vary in different fresh water fishes and this is considered to reflect adaptations to the various environmental conditions [28], [26]. Table-1 shows the results of haematological parameters such as RBC, WBC, HB, PCV, MCV, MCH, MCHC and also Differential Leukocyte Count.

Red Blood Corpuscles (RBC)

The results have showed a significant decrease in RBC number. The Total Erythrocyte count was observed to be decreased, in EUS infected *Channa stiratus* by (63.5%) in relation to control. A decrease in RBC was also reported [23]. Which is sedentary habit of these fishes, the fungal infection induced extravasation of blood and reduction of haemo-synthesis which in turn fails the hematopoietic tissue to release the blood cells [4].

Haemoglobin (HB)

In comparison with the control the HB % infected fish was found decreased by (23%). The Hb variation in *Aphonomyces* infected lake fishes were due to seasonal pollution, low oxygen, heavy native fishes and chemical stress [22], [12] have also reported a decrease of Hb content in fish *Heteroneustes fossils* exposed to paper mill effluents. The fungal and bacterial infection influences the malfunctioning of haematopoietic system [4].

Packed Cell Volume (PCV)

A drastic decrease of (55%) in PCV values in EUS infected fish was recorded. The decrease in the PCV value clearly indicates the anaemic conditions in the infected fish of Dharmasagar, Hasanparthy, and Bhandham lakes [34]. while studying on seasonal and diurnal variations of blood cell types in freshwater teleost, *Colisafasciatus* have reported PCV variation.

Mean Corpuscular Volume (MCV)

Mean Corpuscular Volume in infected fish was found decreased by (27%) in relation with the control which indicates a state of microcytic anaemia due to EUS infection. A decrease in MCV in fresh water fishes is due to abnormal stress

conditions, particularly seasonal, environmental and toxic substances [40], [5]. Chronic fungal, bacterial, viral infection causes a significant decrease in MCV values in fish species like *Saccobranchnus fossilis*, whose condition called normochromic microcytic anaemia[37].

Mean Corpuscular Haemoglobin (MCH)

When compared with the control the MCH value in the EUS infected *Channa striatus* was decreased by (8%) indicating hypochromic anaemia. Present results are in correlation with the studies of Benarjee, (1986) [5] worked on toxicological effects of organophosphorus insecticide on histopathological changes in *Clarias batrachus*.

Mean Corpuscular Haemoglobin Concentration (MCHC)

In comparison with the control the infected fish had shown an increase in MCHC values by (7.5%). The increase in MCHC value is due to macrocytic anaemia.

Total Leucocyte Count (TLC)

A significant increase (21%) of total leucocyte count was found in the infected fish. The enormous increase of leucocyte count in infected *Channa striatus* can be correlated to leucocytosis due to anoxic stress, low temperature, lack of food, high organic and inorganic compounds (NH₃) and heavy native fishes [14]. while studying on *Channa striatus* have reported that leucocytes constitute second important category of the circulating blood cells and will show increased proliferation on exposure to mitogen, concanavalin and also *Aphnomyces invadans* infection indicating leucocytes are polyclonally activated.

Differential Leucocyte Count (DLC):

Lymphocytes

Present study reveals that the lymphocyte percentage in the control fish was $52.0 \pm 0.71\%$ whereas a significant increase of (5.4%) was recorded in the infected fish. This condition is called as the lymphocytosis which is an

immunological response against the stress induced by the polluted environment. An increase of lymphocytes indicates the pathological condition due to EUS and stress full toxic substances in the infected fish [20]. An enhanced lymphocyte proliferation was also observed in Atlantic Manhadevan with ulcer disease syndrome [13].

Neutrophils

In the present study the Neutrophils constitutes high percentage of leucocyte count in the control fish. The neutrophil percentage in the control fish recorded was $59.6 \pm 0.62\%$ while in infected it got decreased significantly by (30.7%). It is commonly a condition called neutropenia. All the physiological causes of leucopenia, results in neutropenia. Haematological values fluctuate in accordance with the variations in the environment [25].

Eosinophils

The eosinophils are less in number compared to neutrophils. Present study results show that, average eosinophil count was $2.5 \pm 0.37\%$ in the control fish but a significant increase of (1.5%) in the infected fish. The increase in the eosinophils percentage may be because of EUS infection. Water pollution has stress effect on the blood parameters, which in turn increases the eosinophil count, by causing allergies[35] observed a significant increase in the eosinophils of infected *Clarias batrachus* an air breathing fish.

Basophils

The normal recorded basophil percentage for the control fish was $2.3 \pm 0.26\%$ while in the fungal infected fish the value has reduced to (0.6%). [35], observed a significant increase in the basophils of infected *Clarias batrachus* an air breathing fish.

Monocytes

The monocytes percentage was $5.7 \pm 0.34\%$ in the control fish whereas it got decreased to (2.3%) in the infected fish. A significant increase in monocytes is also reported in infected *Clarias batrachus* an air breathing fish [35].



Fig: 1. EUS Infected *Channa straitus*

Table-1: Shows Haematological Parameters of Control and Infected fish, *Channa striatus*.

No	Blood Parameter	Control fish	Infected fish	Percent age Change (%)	P value
1	HB (g%)	11.3±0.34	8.7±0.31	-91.3	0.0001
2	PCV %	26.3±0.35	11.95±0.20	-88.5	0.0001
3	MCV (M.gms)	71.7±1.22	52.6±0.70	-47.4	0.0001
4	MCH (M.gms)	23.9±0.40	22.0±0.29	-78	0.0015
5	MCHC (M.gms)	33.1±0.56	35.6±0.47	-64.4	0.0033
6	RBCs (10 ⁶ /ml)	4.4±0.25	1.96±0.14	-98.04	0.0001
7	WBCs (10 ³ /ml)	41670±947.51	50375±893.85	50275	0.0001
8	Lymphocytes %	52.0±0.71	57.4±0.80	-42.6	0.0001
9	Neutrophils %	59.6±0.62	28.9±0.65	-71.1	0.0001
10	Monocytes %	5.7±0.34	3.4±0.31	-96.6	0.0001
11	Eosinophils %	2.5±0.37	4.0±0.36	-96	0.0106
12	Basophils %	2.3±0.26	1.7±0.35	-98.3	NS

CONCLUSION

Thus in conclusion, the fishes of the three lakes viz. Dharmasagar, Hasanparthy and Bhandham were infected by epizootic ulcerative syndrome (EUS). The change in haematological parameters may be due to the EUS infection, seasonal variation, habit and habitat of the fish biology. The study also reveals that fishes are most sensitive to change in their ecosystem which reflects their haematological conditions.

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