International Journal of Global Science Research
Vol. 11, Issue. 2, October 2024, pp. 2496-2499
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: https://doi.org/10.26540/ijgsr.v11.i2.2024.286

Hematological changes in *Channa punctatus* with Epizootic Ulcerative Syndrome

Akshita Ira[1], Pooja Agrahari[2] and M. M. Alam[3]*
[1&2]Department of Zoology, Chandradhari Mithila Science College, Darbhanga, Bihar
[3]*Department of Zoology, Ram Krishna College, Madhubani, Bihar
Corresponding author email: drmmalam79@gmail.com

Received: 30/06/2024
Revised: 13/07/2024
Accepted: 25/07/2024

Abstract: Fish farming has suffered greatly in the last few years as a result of epizootic ulcerative syndrome (EUS). It has been discovered that several fish are afflicted with this widespread sickness. Fish with EUS experienced severe hematological abnormalities. At the 1% level of probability, the decline in leucocytes, hemoglobin content, and erythrocyte count was extremely significant. Additionally, the packed cell volume (PCV) percent-age value dropped. The current study found a trend of decline in the values of several chosen hematological markers in Channa punctatus. The decline was found to be caused by microcytic anemia, which was caused by EUS. EUS thus caused significant hematological changes in the fish under study, Channa punctatus.

Keywords: EUS, Channa punctatus, RBC, Hb, PCV, WBC.

Introduction:

Seasonal epizootic condition of warm-water freshwater and estuarine fish with complicated infections; characterized by necrotizing ulcerative lesion and invasive Aphanomyces infection, which usually results in granulomatous reaction. Epizootic ulcerative syndrome is widespread throughout the world and is currently spreading into temperate, subtropical, and subtemperate climates. In 1988, the EUS disease first appeared in India in the Mithilanchal region, namely in the month of May. This was mostly caused by the introduction of contaminated fish into the area along with flood water. It is crucial to note that fish of exotic species and unclean water areas might spread serious diseases. However, EUS was investigated at the pathological level in Indian fishes by Vishwanath et al. (1998) in relation to a fungal pathogen. However, it is well known from histology that the invasive fungus results in granulomas, severe necrotic changes in the skin and muscle tissue, and eventually forms dermal ulcers (Roberts et al. 1993; Parithabhanu and Subramanian, 2006; Kumar et al. 2009). Parera et al. (1997) looked into several pathways for pathogen entry into the body, including the digestive tract (orally through food or water consumed), direct bacterial entry into the surrounding water, and cohabitation with diseased fish.

Material and Method:

The common name garai, Channa punctatus, was chosen for the current study. It is frequently found in ditches, marshes, paddy fields, and water-logged areas of the

ISSN: 2348-8344 (Online)
DOI: https://doi.org/10.26540/ijgsr.v11.i2.2024.286

Mithilanchal region, encompassing Darbhanga and Nepal's border regions. With the assistance of fishermen, both healthy and diseased fish species were gathered and housed in different aquariums filled with pond water. In order to give the fish affected by the EUS time to adjust to the lab environment, they were housed there for 26 hours. These fish were then employed in research. Because the fish determined to be affected by the EUS were not able to survive for even ninety-six hours, care was made to place these fish under investigation before to dieting. The total count of various leucocytesand estimated hemoglobin content were selected as the hematological parameters. In each of these trials, blood was extracted from the cauda dorsalis of both ulcerative and healthy fish using a plastic syringe. An anticoagulant called ethylene dichlorotrichloroacetae was employed. Total weight (in gms), hemoglobin (in gm%), red blood cells (RBC), white blood cells (WBC), platelets (PCV), neutrophils, leucocytes, monocytes, eosinophils, and basophils (all in %), and their sizes were applied in accordance with the standard procedures of Darmodly and Davenport, 1954 and Akela et al., 1998.

Result and Discussion:

Due to EUS, there was variation in the hemoglobin concentration in Channa punctatus. The average hemoglobin value was found to be 12.61 ± 0.228 gm%. In a similar vein, the data showed a slight change in the overall erythrocyte count, with EUS being the cause of this reduction. The average total count of erythrocytes in all fish, both infected and control, was determined to be 1.118±0.079 and 2.297±0.104 in 10/mm², respectively. Similar variations in leucocyte, PCV, neutrophil, lymphocyte, monocyte, eosinophil, and basophil counts (%) were also noted in Channa punctatus as a result of EUS. According to Table 1, the average values for the control and infected fishes were found to be 2.9877 ± 0.074 and 3.210 ±0.121, 45.90±0.670 and 36.34 ±1.302, 30.0±0.509 and 25.0 ±0.529, 57.0±1.173 and 60.6±0.862, 8.2±0.967 and 9.6±0.513.3.1±0.478, and 4.2±0.340 and 1.5±0.254 and 0.6±0.141, respectively.

The average diameter of basophils and erythrocytes (all expressed in µ) was estimated for blood tissue size (diameter of cells) and found to be 5.52±0.88 and 6.14±0.666, 10.59±0.035 and 10.8±0.024, 7.57±0.014 and 7.22±0.018, 11.66±0.628 and 10.57±0.0499.68±0.027 and 10.43±0.020 and 8.62 ±0.027 and 9.73±0.080, respectively, in both control and infected species of Channa punctatus (Table 2). Due to EUS, a change in the diameter and size of every blood cell was seen. According to the current research, a sharp decline in hemoglobin levels may be the result of anemia, which is caused by bacterial ulcers. These ulcers may have impacted the fish's immune system, neutralizing the elements linked to blood resets and stroma, which influence hemopoiesis and lower the rate of hemopoiesis. Due to a drop in RBC and Hb content, ulcerative fishes may have acquired hypocromatic microcytic anaemia. This anaemia was linked to a decrease in iron utilisation for the production of haemoglobin (Yadav, 1993). Since researchers like Pal and Pal (1986), Yadav and Akela (1994), Verma and Shashi (2004, 2009), and Parithabhanu and Subramaniam (2006) have documented bacterial diseases in several fish species. A reduction in the number of neutrophils, eosinophils, and basophils in Channa punctatus in response to malathion poisoning was also noted. Thus, overall, the study of specific haematological characteristics, such as the size of blood cells in an infected fish called Channa punctatus, has demonstrated a high research value towards significant harm to fish farmers in recent years, which can be presented and eliminated through appropriate treatment and fishand pond management.

International Journal of Global Science Research
Vol. 11, Issue. 2, October 2024, pp. 2496-2499
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: https://doi.org/10.26540/ijgsr.v11.i2.2024.286

Table 1: Haematological changes in Channa punctatus with EUS

Parameters	Control fish	Infected fish
Weight (in grams)	37.10±1.346	41.21±1.333
Haemoglobin (in gm%)	12.61±0.265	7.53±0.228
Erythrocytes (in 106/mm3)	2.297±0.104	1.1170.079
Leucocytes (in 106/mm3) WBC	2.987±0.074	3.210±0.121
PCV(in %)	45.90±0.670	36.34±1.302
Neutrophils(in%)	30.0±0.509	25.0±0.529
Lymphocytes (in %)	57.2±1.73	60.6±0.862
Monocytes (in %)	8.2±0.967	9.6±0.513
Eosinophils (in %)	3.1±0.478	4.2±0.340
Basophils(in %)	1.5±0.254	0.6±0.141

Table 2: Effect of EUS on the average size (diameters) of blood cells of *Channa punctatus.*

Parameters	Control fish	Infected fish
Weight (in gms)	37.10±1.346	41.21±1.333
Erythrocytes (in ½) (RBC)	5.52+0.088	6.14±0.666
Neutrophils(in ½)	10.59±0.035	10.8±0.024
Lymphocytes (in ½)	7.57±0.014	7.22±0.018
Monocytes (in ½)	11.66±0.027	10.43±0.020
Eosinophils (in ½)	9.68±0.027	10.43±0.020
Basophils(in 1/4)	8.62±0.027	9.73±0.080

References:

Vishwanath, T. S, Mohan, C. V. and

ISSN: 2348-8344 (Online)
DOI: https://doi.org/10.26540/ijgsr.v11.i2.2024.286

Shankar, K.M. (1998) Epizootic ulcerative syndrome, associated with a Aungal pathogen in Indian Fishes: histopathology a cause for invasiveness. Aquaculture 165, 1-9.

Roberts, R. J, Willoughgy, L. G and Chinabut, S. (1993) Mycotic aspects of epizootic ulcerative syndrome of Asian fishes. J. Fish. Dis, 16, 169-183.

Parithabhanu, A and Subramanian, M. A. (2006) Histological alterations under tannery elfluent stress during development of oocytes in the ovary of P flavescens. Ind. J. Env. Ecoplan. 12(3), 735-740.

Kumar, S; Singh, A. K. And Shashi, S. B. (2009) Studies on the effect on EUS on haematology of C. batrachus. J.Curr. Sci. 14(1), 73-76.

Parera. R. P. Johnson, S. K. and Lewis, D. H. (1997) Epizootiological aspects of Streptococcus iniae affecting Tilapia in Texas. Aquaculture. 152, 25-33.

Darmady, E. M. and Davenport, S. G. T. (1954) Haematological technique for medical laboratory technicians and medical students. J&M Churchill Ltd. London.27-46

Akela B. P. Yadav H. N and Arti K. (1998) Effect of DAP toxicity on certain haematological parameters of H. fossilis (Bloch). Env. Ecol.16(2), 431-434.

Yadav, S. M. P and Akela, B. P. (1994) Studies on effect of aldrin toxicity of C. batrachus. Curr. Sci. 67(8), 614-617.

Pal. J and Pal, B. C. (1986) A fluorescent pseudomonad capable of growth at 42°C and a micrococcus isolated from epithelial carcinoma in Anabas testiduneus. Proc. 73 Sess. Ind. Sci. Cong. Part 3, 84-85.

Verma, S. K. and Shashi, S. B. (2004) Certain haematological responses of seasonal variations in the common Indian catfish H. fossilis in relation to its health condition. Journal of L N Mithila University. 1 (1), 165-168.