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Study of epizootic ulcerative syndrome on hematological responses on Fish *Channa punctatus*

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Abstract
The present paper deals with the study of epizootic ulcerative syndrome on Hematological responses on Fish *Channa punctatus*. A number of fishes have been found to suffer from this epidemic disease. We are observed that the decreases was due to microcytic anaemia which in torn was due to epizootic ulcerative syndrome. Decrease in count of basophils, neutrophils and eosinophils in fish *Channa punctatus* to malathion toxicity was also observed.

Keywords: Fish *Channa punctatus*, epizootic ulcerative syndrome, basophils, neutrophils, eosinophils

Introductions
Fish contains all the amino essential for human health. Very little information is available on the fish species diversity. Epizootic ulcerative syndrome is epidemic in many countries and is still extending its geographical range even into subtropical, sub-temperate an temperate climate. The emergences of EUS disease in India as well as in Madhepura District was recorded during the year 2019 particularly in May month, emphasized due to entering of diseased fishes along with flood water. The transmission of severe disease through contaminated water area and fish of exotic varieties is significantly important. However Vishawanath *et al.* studied EUS, associated with a fungal pathogen in Indian fishes at pathological level. Whereas histologically, it is well established that the invading fungus causes significant necrotic changes in the skin and muscle tissue, produces granulomas and ultimately results in the formation of dermal ulcers (Robert *et al*.; Parithabhanu *et al*; Kumar *et al.*; Nirmal *et al*. and Parera *et al*.) investigated potential routes of pathogen entry via the digestive tract (orally with ingested food/water), directly by bacteria in the surrounding water or by cohabitation with infected fish.
This paper deals with effect of Epizootic Ulcerative Syndrome (EUS) on certain hematological parameters and size of blood cells in fish *Channa punctatus*.

Methods
In the present study *Channa punctatus*, common name garai was selected, which is common in occurrence in the swamps, ditches, paddy fields and water logged areas of Madhepura district including Supaul and boarder regions of Nepal. Both healthy and infected fish species were collected with the help of fisherman and were kept in separate aquarium containing pond water. The EUS effected fishes were kept in laboratory for 26 hours to acclimatize at laboratory conditions. Then these fishes were used for experiments. Care was taken to bring such fishes under investigation before dieting because the EUS effected fishes found could not survive even for 96 hrs. Estimated hemoglobin content, total count of different leucocytes were chosen as hematological parameters. For all these experiments blood was collected with the help of plastic syringe from the couda dorsalis of the healthy and ulcerative fishes both but separately. Ethylene dichlorotrichloroacetae was used as anticoagulant. The parameters selected for investigations of control and infected fish were total weight (in gms.), hemoglobin (in gm %), RBC, WBC and PCV, neutrophils, leucocytes, monocytes, eosinophils and basophils (all in %) and their sizes were applied as prescribed standard methods of Darmodly and Dvenpartp; Akela *et al.*

Discussion of the results

The concentration of hemoglobin in Fish *Channa punctatus* was exhibited due to EUS. The mean values of hemoglobin was recorded to be 12.61±0.228 gm%.

Table 1: Showing the effect of EUS on certain Hematological parameters of *Channel punctatus*

Parameters	Control fish	Infected fish
Weight (in gms)	37.10±1.344	41.21±1.333
Hemoglobin (in gm %)	12.61±0.263	7.531±0.228
Erythrocytes (in 106/mm^3)	2.297±0.102	1.117±0.07
Leucocytes (in 106/mm^3) WBC	2.987±0.072	3.210±0.121
PCV (in %)	45.90±0.670	36.34±1.302
Neutrophils (in %)	30.0±0.509	25.0±0.527
Lymphocytes (in %)	57.2±11.73	60.6±0.862
Monocytes (in %)	8.2±0.965	9.6±0.513
Eosinophils (in %)	3.1±0.476	4.2±0.340
Basophils (in %)	1.5±0.252	0.6±0.141

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

Parameters	Control fish	Infected fish
Weight (in gms)	37.10±1.344	41.21±1.333
Erythrocytes (in 1/4) (RBC)	5.52±0.086	6.14±0.664
Neutrophils(in 1/4)	10.59±0.033	10.8±0.022
Lymphocytes (in 1/4)	7.57±0.012	7.22±0.016
Monocytes (in 1/4)	11.66+0.025	10.57±0.049
Eosinophils (in 1/4)	9.68±0.025	10.43±0.020
Basophils(in 1/4)	8.62+0.025	9.73±0.080

Similarly the results were found as a minor variation in total count of erythrocytes and this decrease was observed due to EUS. The average value of total count of erythrocytes in all control and infected fishes was calculated to be 2.297±0.102 and 1.170±0.077 in 106/mm^3. Likewise changes in number of leucocytes, PCV, reutrophils, Lymphocytes, monocytes, eosinophils and basophils (%) were also recorded due to EUS in *Channa punctatus*. The mean value of these were calculated to be 2.987±0.072 and 3.210±0.121, 45.90±0.670 and 36.34±1.302, 30.0±0.507 and 25.0±0.527, 57.0±1.173 and 60.6±0.862, 8.2±0.967 and 9.6±0.513, 3.1±0.476 and 4.2±0.340 and 1.5±0.252 and 0.60.141 for control and infected fishes respectively (Table 1).

So far as the blood tissue size (diameter of cells) was concerned, the average diameter of erythrocytes and basophils (all in 1/4) estimated and were found to be 5.52±0.86 and 6.14±0.664, 10.59±0.033 and 19.8±0.022, 7.570.012 and 7.22±0.016, 11.66±0.625 and 10.57±0.049, 9.680.025 and 10.43±0.020 and 8.62±0.025 and 9.73±0.080 respectively in control and infected species of *Channa punctatus* (Table-2). The change in diameter size of all the blood cells was observed due to EUS. In the present investigations, a drastic fall in Hb might be because of anaemia which in turn is due to bacterial ulcer, which might have affected the removes system of fish, that the neutral elements associated with blood resets and stroma which affect haemopoiesis, causing decrease in the rate of haemopoisis. Ulcerative fishes might have developed hyperchromatic microcytic anaemia due to reduction of RBC and Hb content which was attributed to the deficiency of iron and its decreased utilization for hemoglobin synthesis.

Conclusion

Therefore on the whole the investigation of certain hematological parameters including size of blood cells of control an infected fish *Channa punctatus* showed a high research value towards great harm to fish farmers in last few years, which can be presented and eradicated by fish and pond management and suitable treatment.

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