

Summary

The present study dealt with “Haematological and immunological studies of healthy and epizootic ulcerative syndrome affected freshwater teleost, *Cirrhinus mrigala*” consisting of

1. Histological studies of lympho-haemopoietic organs, head kidney, spleen and thymus of both healthy and EUS affected *C. mrigala*. Electron microscopic studies of lympho-haemopoietic organs of healthy and EUS affected fish *C. mrigala*.
2. Studies on blood cell profile in healthy *C. mrigala*.
3. Cytochemical studies on erythropoiesis in healthy *C. mrigala*.
4. Studies on erythropoietic efficiency of head kidney and thymus of healthy and EUS affected *C. mrigala*.
5. Comparison of percentage of mature and immature erythrocytes in peripheral blood of healthy and EUS affected *C. mrigala*.
6. Total count of erythrocytes and leucocytes in healthy *C. mrigala* and EUS affected fishes.
7. Studies on haematological parameters like total erythrocyte count (TEC), total leucocyte count (TLC), total haemoglobin (Hb) content, differential count of three subpopulations of leucocyte, neutrophil, lymphocyte and monocyte in peripheral blood of the healthy fish throughout the year.
8. Studies on the humoral immunity of the fish *C. mrigala*.
9. Count of antibody secreting ‘B’ cells in healthy *C. mrigala*.

Since the first appearance of the epizootic ulcerative syndrome (EUS) in India, in May, 1988, in various north eastern states, it was distinct by its destructive nature and capacity of affecting a wide variety of fish species in both wild and cultured waters. Subsequently, it spread to West Bengal. By 1993 the disease spread all over India except, Jammu and Kashmir, Himachal Pradesh, Punjab and Gujarat.

The histological studies on head kidney, spleen and thymus of healthy *C. mrigala* showed the presence of erythroid cells and lymphoid cells in the three organs. The sections also showed that head kidney was divided into cortex and medulla while the spleen was divided into red pulp and white pulp regions. Histological sections of the thymus showed presence of a thin capsule surrounding the gland. The stroma was divided into lobules by trabaculae originating from the capsule. Lobules were not completely separated. The stroma was not divided into cortex and medulla. It showed presence of haemopoietic cells arranged in cords having epithelial cells. Hassall's corpuscles like structures were also found.

The histological sections of three lymphoid organs of EUS affected *C. mrigala* showed the necrotic changes in three organs. Haemosiderin laden cells were also found in the spleen of EUS affected *C. mrigala*. Haemorrhages were also noticed in the sections of head kidney of EUS affected *C. mrigala*. EUS affected fishes, thymus showed highly eosinophilic areas along with erythroblastic islets, cords of mature erythrocytes and reticular epithelial cells.

Electron microscopic studies on the three lympho-haemopoietic organs showed the presence of different cell types such as, erythrocytes, erythroblasts, haemoblasts, neutrophilic myelocytes, macrophages, thrombocytes, small lymphoid haemoblasts and lymphocytes. All these cell types were more or less common in these organs but varied in number. Hypertrophied epithelial cells and secretory cells were exclusively found in thymus.

The Electron microscopic studies of the three organs in EUS affected *C. mrigala* showed the presence of bacteria along with fibrin clumps and melanin deposition.

Studies were also conducted on the erythropoiesis of *C. mrigala* and different developmental stages of erythrocytes e.g., small lymphoid haemoblasts or sh1, basophilic erythroblasts or be, polychromatophilic erythroblasts or pe, acidophilic erythroblasts or ae, young reticulocyte or ye and mature erythrocytes or me were detected.

Studies on blood cell profile in peripheral blood of healthy *C. mrigala* showed the presence of erythrocytes, agranulocytes like lymphocytes and monocytes, granulocytes like, neutrophils, eosinophils and basophils. Along with these, plasma cells were also identified. Erythrocytes were found PAS negative while neutrophils were strongly PAS positive but lymphocytes and monocytes were slightly PAS positive.

The cell diameter of each type of blood cells and nuclei diameter were measured. The n-c ratio of each type was also calculated.

Erythropoietic efficiency of head kidney and thymus in both healthy and EUS affected *C. mrigala* showed that erythropoietic efficiencies of those organs in EUS affected *C. mrigala* were significantly lower compared to that of healthy *C. mrigala*.

Total count of erythrocytes and leucocytes in peripheral blood of both healthy and EUS affected *C. mrigala* showed that in EUS affected *C. mrigala* the total erythrocyte count was significantly lower while total count of leucocytes was found significantly higher compared to healthy *C. mrigala*.

Differential count of leucocytes in peripheral blood of healthy and EUS affected *C. mrigala* showed that percent of lymphocytes and monocytes were significantly higher in EUS affected *C. mrigala*.

Studies on haematological parameters in healthy *C. mrigala* throughout the year showed that the haemoglobin content, total erythrocyte count, total leucocyte count and differential count of three subpopulations of leucocytes varied with season. Total erythrocyte count or TEC significantly decreased during July and August followed by an increase during October to December. Total leucocyte count increased during February and March followed by decrease during April to August and again decreased during winter months.

The experiments related with immunological studies of healthy *C. mrigala* throughout the year showed that during winter season when every year EUS outbreak takes place in the ponds of the plains of North Bengal, total antibody production and

number of antibody secreting 'B' cells decreased significantly. The antibodies produced were found 2-ME sensitive.