RESEARCH ARTICLE

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Effect of Sporozoan Parasite *Myxobolus* on Different Organs of Some Fresh Water Fishes: A Histopathological Study

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ABSTRACT

Histopathological study of effects of Myxobolus infection in different organs of some fresh water fishes was carried out. The fishes such as Channa striatus, Heteropneustes fossilis, Labeo rohita and Clarias batrachus were taken for study. Fishes were dissected to remove the organs and tissue samples were fixed in Bouin's solution for 24 hours using routine histological techniques, sections were prepared and stained with hematoxylin and eosin. In histopathological examination, large cysts were seen in kidney and liver. Necrotic changes in kidney tubules associated with calcification of cells of blood capillaries were observed. Skin and muscles were also found to be infected.
Key words: *Histopathology, Myxobolus, Fresh water fishes, Liver, Kidney*

INTRODUCTION:

Fresh water fishes are an important source of food because of their low fat and high protein content. These are found in lakes, streams, water reservoirs, rivers and ponds. These water bodies often get infected due to pollution and eutrophication. Fish parasites resulted in huge economic losses as they increase mortality and cause reduction in growth rate and possibly weight loss during and after the period of parasitic disease. Fish disease and histopathology is increasingly being used as indicators of environmental stress since they provide a definite biological end point of historical exposure (Steniford *et al*, 2003).

Sporozoan parasites are endoparasitic protozoans and known to cause infection in fishes. These are the endoparasites occur in the skin, muscles and various visceral organs and are causative agent of various diseases in fishes. These infections may result in their decline and can pose a great risk in their availability. Many species of *Myxobolus* are highly pathogenic, often causing fatal diseases or even death to host fish. In natural waters, fishes exhibit diseases in exceptional cases, but when fishes are in small water bodies, they often get diseased (Chakravarti, 1994).

Histopathological changes in liver, kidney, spleen and intestine of *Cirrhinus mrigala* on the twist disease of *Hypophthalmichtys molitrix* parasitized by *Myxobolus drgafino* was described by Yu and Wu (1992). Similarly, histopathological studies of the skin, muscles, gill, liver, kidney, heart, and spleen of *Cirrhina mrigala* naturally infected with *Myxobolus* sp. were carried out by Das et al. (2000). Present study has been undertaken to observe the effects of this parasite on various organs in some infected fresh water fishes.

MATERIAL AND METHODS:

The fresh water fishes were brought to the laboratory from different localities of Aligarh region and kept in aquarium. The behavioral and gross pathomorphological changes in the spontaneous cases were recorded. The fishes were dissected to remove gills, kidney and liver. Tissue samples from these organs were taken and fixed in Bouin's solution for 24 hours, dehydrated using graded series of alcohol, embedded in paraffin wax, sectioned and examined by light microscope. Finally photomicrographs were taken out with the help of a digital camera.

RESULTS AND DISCUSSION:

Various histopathological changes were observed in different organs such as liver, kidney, skin, muscles and gills due to infection of *Myxobolus*.

1. Pathological effects on Kidney:

Infection was observed in blood capillaries, uriniferous tubules and near glomerulus. The capillary tuft of the glomeruli was shrunken and hyperchromatic, leaving increased space within the thickened Bowman's capsule due to the infection of *Myxobolus* in *Channa striatus*, while in infected *Clarias batrachus* and *Heteropneustes fossilis* glomerulus cells were swollen, scattered. Vegetative growth of the cysts was also noticed in glomerulus tubules. Glomerulus cells were found to be ruptured in both specimens. Das et al. (2000) also described shrunken and hyperchromatic tuft of glomerulus, leaving increases space within the thickened Bowman's capsule. Yu and Wu (1992) reported many changes in kidney tubule and glomerular capsule while studying histopathological changes in *Hypophythalmichthys molitix* suffering from twist disease.

The calcification of cells of blood capillaries as well as lymphocytes was observed in kidney. The highest calcification was found in *Channa striatus* followed by *Clarias batrachus, Labeo rohita* and *Hereropnestes fossilis*. The obstruction of the blood vessels by vegetative stage of *Myxobolus* leads to vital damage in internal organs which can undergo degeneration as well as rupture of the blood vessel walls. Mishra et al. (1982) reported enzootic nature of myxosporidiasis in Indian major carps causing degenerative and necrotic changes in kidney tubules.

2. Pathological effect on Liver:

Infection in liver was observed only in *Channa striatus*. Parasitic infection was noticed at the margin of pancreatic lobule. The parasites were found to be embedded in between two blood vessels. Calcification of cells was observed. Cells were ruptured at the site of infection. Large cysts were also seen in the liver. Yu and Wu (1992) noticed atrophy of liver cells in *Cirrhinus mrigala.*

Fig. 1: Photomicrograph shows vegetative growth of cells in kidney of *Channa striatus* (X1000)

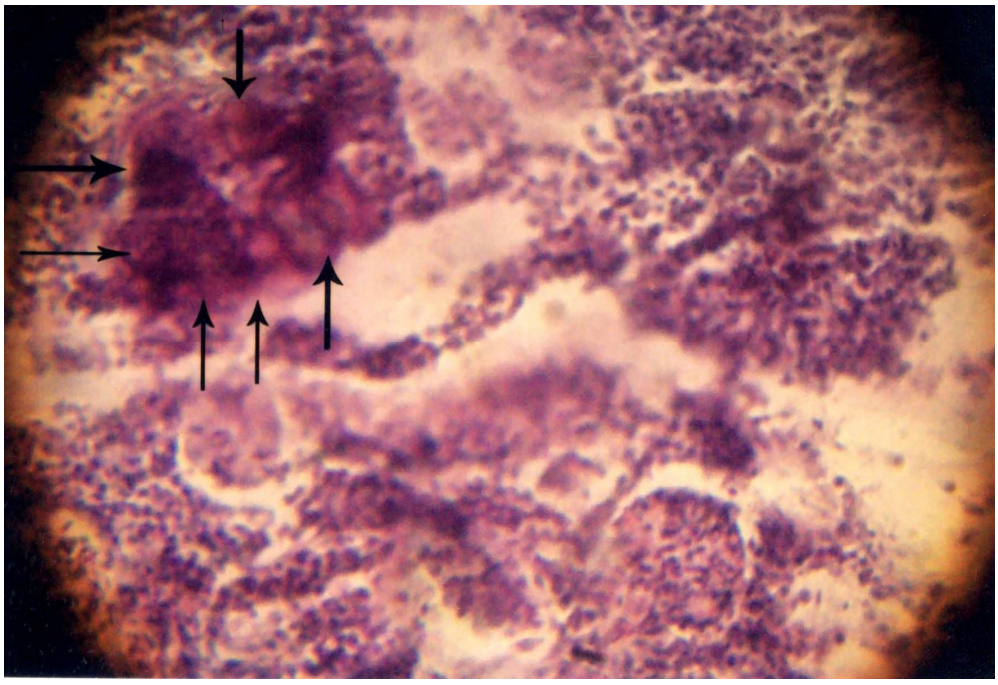


Fig. 2: Photomicrograph shows calcification of cells in kidney of *Channa striatus* (X1000)

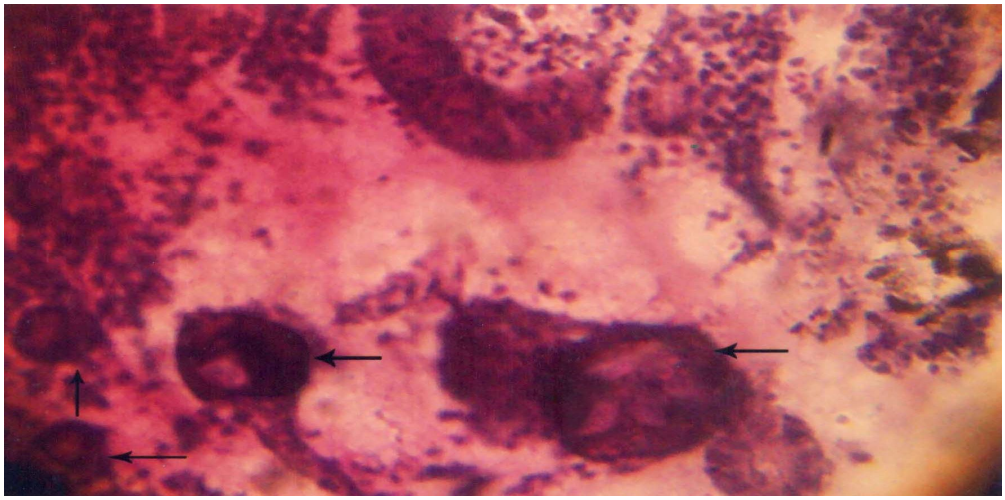


Fig. 3: Photomicrograph shows calcification of cells in liver of *Channa striatus* (X1000)

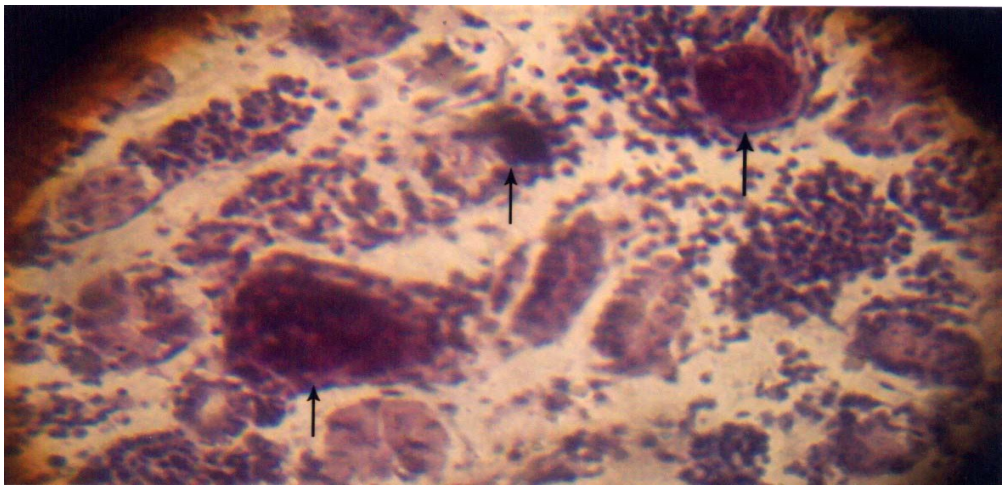
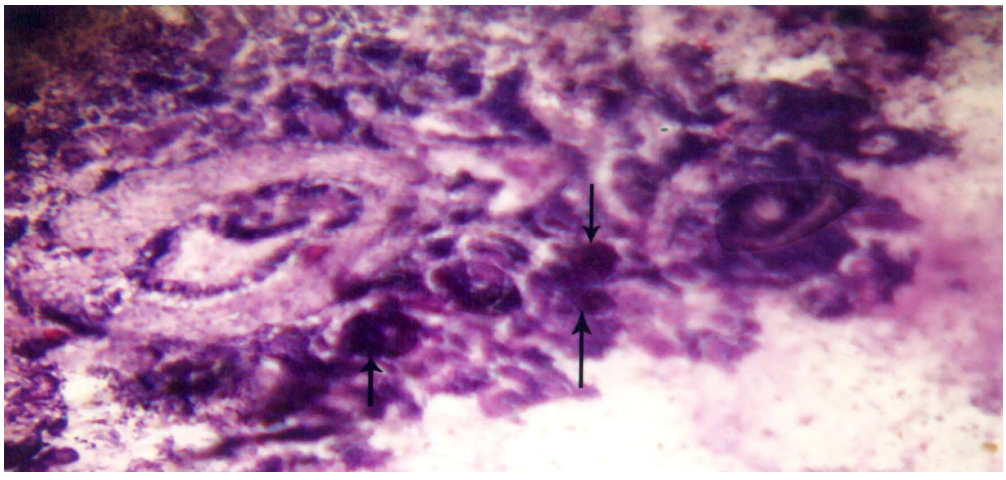


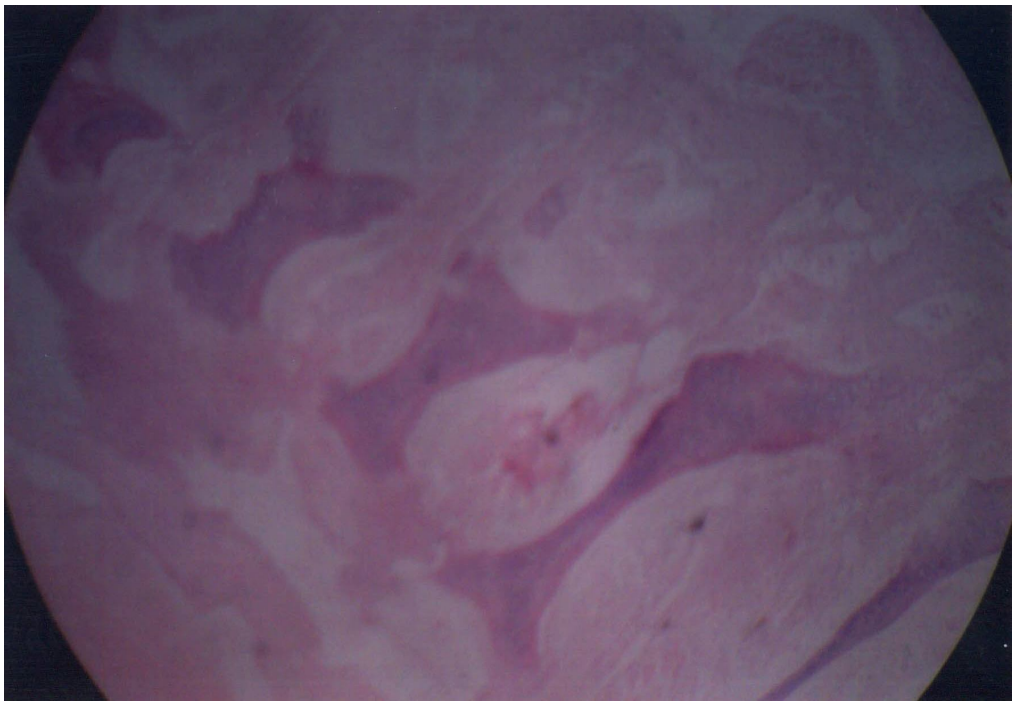
Fig. 4: Photomicrograph of liver tissues showing *Myxobolus mulleri* embedded in between two blood vessels of *Channa striatus* (X1000)



3. Pathological effect on other organs (Gills, Skin &Muscles):

Infection in gills was reported only in *Clarias batrachus*. The spores of parasite lied in connective tissues near to blood vessels. Free end of gill lamellae seems to be swollen. No calcification was observed in cells of gill lamellae. Gill lamellae were fused at the tip, necrosis in gill filament was observed. Das and Mukherjee (1998) also reported fusion of gill lamellae at the tip due to hyperplastic changes. Dey et al (1988) reported myxosporidian infection in *Catla catla.*

Fig. 5: Photomicrograph of skin showing melanophores in rupture form in *Clarias batrachus* (X1000)



Histopathological changes were also observed in the skin and muscles. Muscle tissues exhibited a variety of changes characterized by focal to multifocal areas of degeneration with loss of cross striations of myofibrils. Areas of marked Zenker's necrosis with mild to moderate infiltration of leukocytes and edema were evident at many places. Parasite cysts were observed inside the muscle tissues surrounded by fibrous tissue and melanin pigments. Das et al. (1991); Das & Mukherjee (1998) described that melanophores may be engulfed by dermal macrophages which migrate through the epidermis to release them into the surface mucous. Ruptured melanophores were observed in *Clarias batrachus* only. Pimples were observed on the skin of *Channa striatus*. No calcification was reported in skin.

CONCLUSION:

Present study showed that the parasite *Myxobolus* affects various organs of fresh water fishes and its presence may lead to impaired physiological functions of the host.

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