



HISTOPATHOLOGY OF *HENNEGUYA NOTOPTERIDAE QADRI, 1965* INFECTION IN FRESHWATER FISHES

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Abstract:

Examination of freshwater fishes from Ekburgi reservoir in Washim region of Maharashtra revealed the presence of Myxosporidian species of the genus *Henneguya* Thelohan, 1892, on gill surface of cultured freshwater fishes. The *Henneguya* species reported during the present research is *Henneguya notopteridae Qadri, 1965* with heavy infection on gill surface and kidney of freshwater fishes *Catla catla*, *Labeo rohita* and *Notopterus notopterus*. The present research emphasizes the morphometric of *Henneguya notopteridae* parasite together with histopathological impact on fish. *Henneguya notopteridae* infected fish exhibits haemorrhagic condition with necrotic changes in the epithelia and connective tissue of gills. Pronounced inflammation has been observed leading to structural disorganization of secondary lamellae. Nearly complete loss of respiratory function, accompanies infection.

Keywords: *Henneguya*, Histopathology, Freshwater fish, Infection

Introduction:

Myxosporidia are almost exclusively fish parasites. Some species are very harmful and can weaken or kill their hosts, leading to important economic losses (Okaeme *et al.* 1988). These parasites affecting a wide range of tissues. They are extremely abundant and diverse group of organism dispersed in native and pond reared fish population. Among the myxosporidians, the genus *Henneguya* Thelohan, 1892 which includes at least 126 species (Lom & Dykova, 1992), is one of the largest genera in the family Myxobolidae infecting fresh water and marine fishes. Infection of *Henneguya* species is reported worldwide by various workers from freshwater fishes includes Mc Craren *et al.* (1975), Dykova and Lom (1978), Kalavati and Narasimhamuri (1985), Molnar (1988), Ali (1999), Martins *et al.* (1999), Eiras *et al.* (2002, 2005), Kalavati and Nandi (2007) that results in serious losses. Therefore the present study was carried out to study the effect of *Henneguya notopteridae Qadri, 1965* species with the help of histopathological analysis.

Material and Methods:

The host fishes for the present study were collected from various dams and local fish market from 2010 to 2014. The collected fishes were brought to laboratory for necropsy procedure for examination of Myxozoan parasites. As such when cysts or abnormalities in the organs were noticed, myxozoans were suspected. For temporary mounting of parasites, fresh saline wet mounts were prepared. Fresh spores were mounted in Lugol's solution for presence of iodophilous vacuoles in sporoplasm and Indian ink for presence of mucous coat around the spore. Extrusion of

polar filament was achieved by treatment of fresh spores with 10% KOH. For permanent preparation, a smear using fresh spores was prepared and allowed to air dry. Then these spores were fixed in 10% buffered formalin and stained in Giemsa's stain (Cone and Anderson, 1977) and mounted in DPX. Examinations of preparations were made under Olympus phase-contrast microscope at 100x magnification and The photographs of the slide were taken with the digital camera and drawing were made with Camera Lucida to illustrate the structure of spore. Measurements of spores were taken in micrometer with the aid of calibrated ocular micrometer. For histopathological analysis, the cysts were fixed in 10 % buffered formalin for 24 h, embedded in paraffin, cut into 4 µm thick sections and stained with hematoxylin and eosin. The photographs of the histopathology slides were taken with the digital camera of microscope. Identification of *Henneguya* species was done using standard literature of Kudo (1966), Eiras *et al.*, (2002), Kalavati and Nandi (2007).

Result and Discussion:

The present study clearly demonstrate the presence of *Henneguya notopteridae Qadri, 1965* species from gill surface and from kidney of some freshwater fishes collected from Ekburgii dam.

Henneguya notopteridae (Qadri, 1965)

Taxonomic Summary-

Type host: *Notopterus notopterus*, *Labeorohita*, *Catla catla*

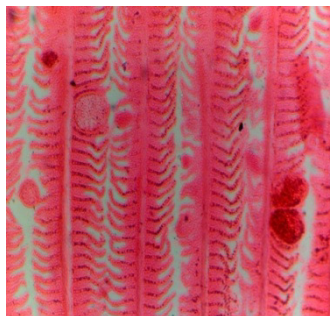
Parasite: *Henneguya notopteridae Qadri, 1965*.

Type locality: Ekburgi dam, Washim, Maharashtra

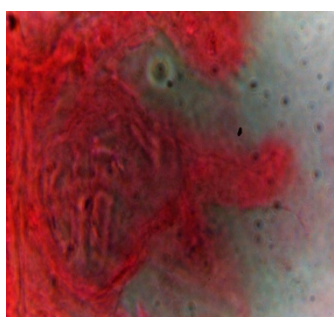
Site of infection: Gills, Kidney

Histopathology of fishes infected with *Henneguya notopteridae* (Qadri, 1965) :

1. Gills of healthy Freshwater fish (200x)



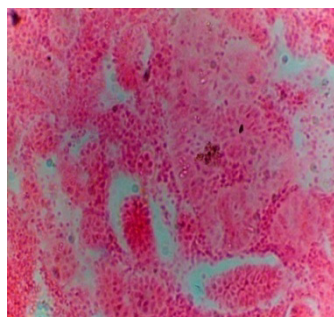
2. Gills of Infected Labeo rohita fish (200x)



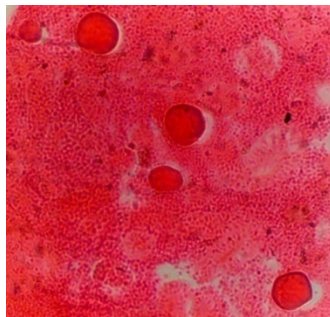
3. Gills of Infected Notopterus fish (400X)



4. Gills of infected Catla catla fish (400X)



5. Kidney of Healthy Freshwater fish (200X)



6. Kidney of Infected Notopterus fish (200X)

Photoplate 2: Showing histology of normal gills and histopathology of infected fishes (Eosin and haematoxylin staining)

In the present study, the histopathological analysis of gills infected with *Henneguya* indicates presence of myxosporean cysts of *Henneguya* at several developmental stages over the entire lamellae. The given study reports two types of branchial infections known as interlamellar form that develop cyst between the lamellae and intralamellar form that develop cyst within the lamellae. In intra lamellar type of plasmodia spore development occurs within the capillaries or blood vessels of gill lamellae that result in opaque, spore filled cysts found in large numbers. Intralamellar vascular type of plasmodia which is the common type with

plasmodia formed in the vascular network of the gill lamellae. These plasmodia may be large or small in size occupying single lamella causing dilation of lamellae and deformation in adjacent gill lamellae. Each plasmodium was bounded by a thin membrane and its lumen was filled with large number of spores, infiltrated epithelial cells and macrophages. The smaller cyst may be seen at the base; centre and tip of the gill lamellae and larger cyst occupy the whole length of gill lamellae causing hyperplasia of the gill epithelium and atrophy of gill lamellae at the cyst site. Hyperplasia is a common and unspecified response to parasitic infection

causing fusion of secondary lamellae resulting in reduction of respiratory surface and in interlamellar type of plasmodia spore development occurs among basal cells between gill lamellae. As spore formation progresses, lamellae tissue become greatly hypertrophied and lose all its normal structure. Infected fish exhibits haemorrhagic condition with necrotic changes in the epithelia and connective tissue of gills. Pronounced inflammation has been observed leading to structural disorganization of secondary lamellae. Nearly complete loss of respiratory function accompanies infection. Fish exhibits signs of anoxia and swims at surface of pond with flared gill operculae. Similar fish response was reported by McCraren *et al.* (1975) reporting both types of plasmodia on gills of Channel catfish with most outstanding interlamellar branchial form responsible for significant losses among immature catfish and unique papillomatous form. According to Dykova and Lom (1978), the response of soft tissues of fish to myxosporidian infections involved displacement, atrophy or hyperplasia of the tissue surrounding the plasmodium during its growth and maturation. In more advanced stages, when the cysts are full of mature spores, an inflammatory reaction occurs, resulting in the rapid replacement of cyst by granulomatous tissues. Similar observations have also been made by Kalavati and Narasimhamuri (1985) in *Chhana punctata* with *H. waltirensis*. Molnar (1988) also reported hyperplasia and the formation of a thick layer of granular tissue. El-Matbouli *et al.* (1992) confirmed these results with *H. psorospermica*. Martins and Souza (1997) studied the gills of *Piaractus* parasitized by *Henneguya sp.* Ali (1999) reported that the intralamellar form of *Henneguya* that develops outside the blood capillaries of the gill filament in Nile perch, *Lates niloticus*. In a similar histopathological study of the gills of *S. lucioperca* parasitized by *H. creplini*, which produce same kind of cysts, as described in the present study. Martins *et al.* (1999) described epithelial, haemorrhage and an intense inflammatory mononuclear infiltrate in the secondary lamellae of *Leporinus macrocephalus* infected with *H. leporinicola*.

Barassa *et al.*, (2003) reported that *H. chydadea* causes histopathological alterations included compression of capillaries and retraction of the neighbouring lamellae that results in structural deformation of gills. Barassa *et al.* (2003a) also reported *H. curvata* causing deformation of lamellar structure which led to slight oedema which further results in

fusion of secondary lamellae and epithelial cells proliferate around plasmodia and results in thickening of epithelial surface. Adriano *et al.* (2009) made similar observations that presence of plasmodia affect the gill functions and drastically reduces the respiratory surface. The result of the present study indicates that these parasites are potentially pathogenic, and that a high parasite load could compromise normal functioning of fish.

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