Clinical and histopathological investigations in exotic catfish
Pangasianodon hypophthalmus (Sauvage, 1878) under culture condition

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ABSTRACT
Diseases of farmed exotic catfish (Pangasianodon hypophthalmus) were investigated by clinical and histopathological examination. Fishes showing clinical signs of disease (anal protrusion, hemorrhage, red eyes and mouth, ulcer on the body surface, grayish cotton wool patches on skin, eroded tail and fins) were sampled from the fish farm of the Bangladesh Agricultural University (BAU) and a private fish farm viz., Al-Falah Agro Farm (AAF) of Mymensingh District of Bangladesh. Gills of fishes were found to have the most prominent pathological conditions followed by kidney, skeletal muscle and liver. Loss of epidermis, massive infiltration of blood cells in the dermis and necrosis with vacuolation were observed in the affected fishes of BAU fish farm. In addition to these pathological changes, fishes of AAF were found to have pyknotic nuclei in dermis. General gill pathology of fishes from two farms included lamellar hypertrophy and hyperplasia, telangiectasis, haemorrhage, lamellar fusion and necrosis of lamellar epithelial cells. Liver pathology included necrotic and vacuolated hepatocytes. Mild haemorrhagic lesion, pyknotic nuclei and melanomacrophage centers were also found in the liver of fishes of both farms. Major renal pathology included necrotic and ruptured kidney tubules and renal corpuscles, severe haematopoietic necrosis, presence of melanomacrophage centers and haemorrhages.

Keywords: Clinical observation, Disease, Histopathology, Pangasianodon hypophthalmus

P. hypophthalmus (syn: Pangasius hypophthalmus and Pangasius sutchi) is a valuable aquaculture species in South-East Asian countries. It was introduced to Bangladesh from Thailand (hence popularly known as Thai pangas) in 1989 (Banglapedia, 2006) aimed at increasing overall aquaculture production and to meet the increasing demand for food fish. Presently this fish is one of the important species in aquaculture of Bangladesh owing to its fast growth, year round production and high productivity. Local market demand of Thai pangas is very high because of low price and the species also has export potential.

P. hypophthalmus is highly tolerant to adverse environmental conditions such as low dissolved oxygen, pH and fluctuations in turbidity (Belton et al., 2011). However, with rapid expansion and intensification of farming systems, there is growing concern about the health and incidence of disease problems in culture of this species. Ferguson et al. (2001) described bacillary necrosis in Vietnamese P. hypophthalmus which Crumlish et al. (2002) later identified to be caused by Edwardsiella ictaluri. Currently in Bangladesh, disease incidence is one of the major problems restricting P. hypophthalmus farming. Due to lack of diagnostic support and appropriate therapeutants, farmers are facing severe financial losses from diseases. As a consequence, the return from farming of this species is decreasing and the livelihood of farmers is under threat. The present study was therefore taken up to examine the disease conditions of farmed P. hypophthalmus using clinical and histopathological techniques.

P. hypophthalmus were cultured for nine months at Bangladesh Agricultural University (BAU) fish farm, where three experimental ponds each with 80 m² area were used for culturing fish. Fishes were also sampled from three ponds (average pond area- 0.38 ha and depth - 1.13 m) of a private fish farm viz., Al-Falah Agro Farm (AAF). The stocking density was 49,400 and 61,750 fry per ha in BAU fish farm and AFF respectively. Initially, a commercial catfish feed was supplemented in BAU fish farm at 10% body weight twice a day and 3% feed during adult stage. Fish in AFF were also supplemented with commercial feeds, fed twice a day with around 20% and 5% body weight respectively during the initial and adult stages.

For examining the disease status of P. hypophthalmus, 20 fishes each from the selected ponds of BAU fish farm and AAF were sampled every month and carried alive to the Fish Disease Laboratory of the Faculty of Fisheries, BAU, Mymensingh. The sampled fishes were examined for external signs of colour changes, injury, lesion, fin...
damage and other abnormalities. Fishes were then anaesthetised, dissected and small pieces of skeletal muscle, gill, liver and kidney were collected and fixed in 10% neutral buffered formalin for histopathological investigations. Fixed samples were dehydrated, embedded with molten wax, sectioned at a thickness of 5 µm and stained with haematoxylin and eosin (Roberts, 2001) and observed under microscope.

The most prominent clinical signs of diseased fishes from both the farms included reddish discoloration around mouth as well as eye (Fig. 1) and anal protrusion (Fig. 2). Weak body, pale gill, missing of secondary gill lamellae, grayish cotton wool like lesion, eroded tail and red spots in the ventral and dorsoventral region were also noticed. Several fishes had deep ulcerative lesions on the body surface. Siddik (2009) reported clinically large external ulcerative lesions, petechial haemorrhages and reddening of the abdomen in *P. hypophthalmus* experimentally infected with *Aeromonas hydrophila*. Faruk (2008) also made similar observations in *P. hypophthalmus*. According to Ferguson et al. (2001) farmed *P. hypophthalmus* affected by bacillary necrosis exhibited swollen abdomen and petechial haemorrhages on the tail and fins.

Major histopathological observations in the skeletal muscle of fishes sampled from BAU fish farm included massive infiltration of blood cells in the dermis. Other pathological changes like loss of epidermis, dermal necrosis and pyknosis in the dermis as well as hypodermis and vacuolation were also observed. Fishes sampled from AFF showed infiltration of inflammatory cells, vacuolation and pyknotic nuclei in the dermis and spongy substances in epidermis. In some cases, epidermis was totally lost and massive amount of inflammatory cells were observed in the muscle of fishes of AFF. Faruk et al. (2005) reported similar pathology in skin and muscle tissues of *P. hypophthalmus* while examining the effects of some herbal extracts on naturally and artificially infected fish. Khatun (1999) observed loss of epidermis, ruptured and necrotic dermis with vacuolation, and fungal granuloma in skin and muscle of affected catfish *Clarias batrachus*.

Gills of fishes from two farms tended to be more often and severely affected than other organs. General gill pathology included missing of secondary gill lamellae, lamellar hypertrophy and hyperplasia, haemorrhages, lamellar fusion and necrosis of lamellar epithelial cells. Telangiectatic secondary gill lamellae with hyperplasia and hypertrophy were found very common in (Fig. 3 and 4). In addition, spongiosis in the secondary gill lamellae with massive number of inflammatory cells were also observed. Similar results were reported by Ahmed et al. (2000) in *C. batrachus*. They found marked hyperplasia, hypertrophy, numerous inflammatory cells and haemorrhagic lesions in both primary and secondary gill lamellae in fish.

Liver of clinically sick fishes of both farms showed haemorrhagic lesions, necrosis with marked vacuolation in hepatic tissue, ruptured blood vessels and presence of many blood cells. Focal necrosis with lymphocyte infiltration, presence of melanomacrophage centres,
pyknotic nuclei were also found in some fishes. Angka (1990) found hepatic necrosis and hemorrhage in liver of walking catfish, *Clarias batrachus* associated with *Aeromonas hydrophila* infection.

Renal histopathology revealed ruptured kidney tubules and renal corpuscles, haematopoietic necrosis, presence of melanomacrophage centers and haemorrhage in fishes of both farms. Fergason et al. (2001) observed acute to sub-acute multiple focally extensive areas of necrosis progressing to pyogranulomatous lesions in the kidney of *P. hypophthalmus*.

The susceptibility of fish to disease and the pathological situation in fish depends on environment and on the virulence of the pathogen (Morvan et al., 1998). The present study highlighted incidence of certain disease/pathological conditions in *P. hypophthalmus* under farming conditions, based on clinical/histopathological investigations. However, further studies are needed to identify and characterise etiology of the disease conditions in order to formulate suitable disease control measures in farming of the species.

**References**


