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Study on Health Condition of A Catfish (*Mystus Vittatus)* in Fish Markets of Mymensingh, Bangladesh

Kongchain Marma[1], Shyamal Kumar Paul[*2], Gias Uddin Ahmed[1], Ahasan Habib[2] , M. Golam Mustafa[2]

[1]Laboratory of Fish Disease, Department of Aquaculture, Faculty of Fisheries, Bangladesh Agricultural University Mymensingh, Bangladesh

[2]Department of Fisheries and Marine Science, Noakhali Science and Technology University, Sonapur, Noakhali, Bangladesh

ABSTRACT

Diseases were investigated through clinical and histopathological observation of a catfish (*Mystus vittatus)* collected from three fish market of Mymensingh town and adjacent areas for a period of six months. Clinically, it was observed that *Mystus vittatus* were more affected showing scale loss, red spots, deep dermal ulcer in the months of December and January observed in Sankipara Railway Crossing and Gollpukurpar fish markets. The fishes showed no apparent disease symptom during October to November and February to March. Histopathologically, marked necrosis, pyknosis, haemorrhage and fungal granuloma were observed in skin and muscle. Gills of fishes from Sankipara Railway Crossing and Gollpukurpar markets were found to contain monogenetic trematode, hypertrophy, clubbing and pyknosis in December and January. Fish kidney and liver displayed fungal granuloma, necrosis, haemorrhage and vacuoles from Gollpukurpar market and Sankipara Railway market. The concerned species were found more affected by pathogen in Gollpukurpar and Sankipara Railway Crossing market than observed in the Kamal Ranjit market by during the months of December and January.

Keywords: Fish Disease**,** *Mystus Vittatus*, Fish Market, Histopathology, Bangladesh

I. INTRODUCTION

Mystus vittatus is under the family of Bagridae and locally known as Tengra in Bangladesh. It`s has one dorsal spine, six to seven dorsal soft rays and twelve to thirteen anal soft rays. Body elongate and slightly compressed. Body colours vary with age; generally delicate gray-silvery to shining golden, with several pale blue or dark brown to deep black longitudinal bars on the side. Sometimes presents a narrow dusky spot on the shoulder (Taki, 1974) [1].

There are about 50-60 small indigenous fish species are abundantly found in almost all freshwater areas of Bangladesh. Most of those species are sold in the local fish markets passing through different marketing channels. Fresh and healthy catfishes have great market demand. Unhealthy and disease affected fish species has little commercial value. These small fishes are a great source of animal protein, vitamins and minerals and these vitamins and minerals are not commonly available in other foods (Thilsted *et al*., 1997) [2]. Fish provides 60% of animal protein and 6% of the total protein intake by the peoples of Bangladesh (DOF, 2016) [3].

The fish disease may occur due to many reasons, of which indiscriminate use of insecticides, pesticides and inorganic fertilizers in the agriculture sector and industrial discharge and sewerage are the major contributors disrupting the natural ecological habitat of the aquatic fauna. Ecological imbalance, susceptible host, and presence of virulent pathogens are presumed to be the principal causes for fish disease outbreak both in culture and in wild condition. Fish disease is one of the most important problems of fish production in Bangladesh (Rahaman *et al.*, 1996) [4]. Common diseases of freshwater fishes of Bangladesh includes Epizootic Ulcerative Syndrome (EUS), tail and fin rot, bacterial gill rot, dropsy, various type of fungal disease, parasitic disease, protozoan disease, nutritional disease, tumours (Chowdhury, 1998) [5]. In most cases haemorrhage, septicaemia, different kinds of lesion, gill

damage, etc. are the common symptoms of the affected fish. The catfish and snakeheads in flood plains and closed water reservoirs are more susceptible to disease outbreaks (Hossain and Mazid, 1995) [6]. Barua, 1990 [7] reported that some of indigenous fish species were seriously affected by EUS in 1988. The clinical signs and histopathological observation may be very helpful in diagnosing of fish diseases. Now a day, histopathological technique is one of the most important procedures for disease diagnosis in fish. Due to financial implications, this procedure have been used in limited scale for disease diagnosis of fishes in Bangladdsh (Moniruzzaman, 2000) [8]. Earlier Ahmed *et al.*, (1998) [9], Sanaullah and Ahmed (1980) [10] employed histopathological techniques for diagnosis of fish diseases. The histopathological study on the gill filaments of heavily infected fish showed hyperplasic proliferation desquamation of the epithelial lining, vascular degeneration, oedema, necrosis and dilatation of branchial blood vessels (Meguid, 1995) [11]. As freshwater catfishes, particularly *Mystus vittatus* are very important species in Bangladesh for its excellent taste, high nutritional value and rapid consumer acceptance, therefore, the present study was undertaken to identify and diagnose different types of diseases occurring in *Mystus vittatus* (Tengra) from different fish markets of Mymensingh, Bangladesh.

II. METHODS AND MATERIAL

The study was conducted for a period of six months from October 2005 to March 2006. In every month, about ten live sampled fishes (*M. vittatus*) were collected from different fish markets of Mymensingh town and adjacent market such as, Sankipara Railway Crossing Market (SRCM), Gollpukurpar Market (GPM) and Kamal Ranjit Market (KRM) and immediately carried to the Fish Disease Laboratory of the Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh. Before bring to the laboratory, each live fishes were transported through plastic bag with oxygenated water. The origin of the fishes was noted down from fish traders. The sampled fishes were examined for observed external signs, any injury and other abnormal conditions of fish body by naked eye. For histopathological observation, samples of fish from various organs such as skin, muscle, gills, liver and kidney were collected by a sharp scalpel and forceps and preserved in 10% neutral buffered formalin. The preserved samples were taken out, trimmed to a size of 3 mm^3 and placed separately in a perforated plastic holder. The samples were then arranged in a steel rack systematically and then dehydrated, cleared and infiltrated in an automatic tissue processor (SHANDON, CITADEL 1000). After dehydrated, the samples were embedded with melted wax, steel molded and perforated plastic holder. Sections were cut from the blocks at a thickness of 5 micrometres by using the microtome machine. The sections were then stained with haematoxylin and eosin stains, studied under a compound microscope (Olympous). Photomicrographs of stained sections were done by using a photomicroscope, (OLYMPUS, Model CHS, Japan).

III. RESULTS AND DISCUSSION

3.1 Clinical study of fishes

The sampled fishes were found almost in normal appearances and healthy condition in all of fish market during October and November that were collected from Kalia beel and Bramhputra River, Mymensingh, Bangladesh. *Mystus vittatus* were observed to have rough skin, mild scale loss, body discoloration with minor red spots during October and November. Severe abrasion, scale loss, weak body, red pots, deep ulcer, subcutaneous lesion were recorded from the fishes of three markets in the months of December and January. Presence of pronounced disease symptom in *Mystus vittatus* such as, minor red spots and discoloration of skin were also noted from beel's fishes in October and November by Hossain *et al.*, (2009) [12] and Moniruzzaman (2000) [8]. Small indigenous fishes like *Puntius ticto*, *Nandus nandus* and *Channa punctatus* were severely affected during the months of December and January as evidenced thorough visual and clinical, observations by Marma *et al.*, (2007) [13] and Parveen (2001) [14]. Ahmed and Hoque (1999) [15] also mentioned that clinical symptoms like gray, white necrotic areas were increased in December, January and February in various carp species of Bangladesh. In fish of all markets pale body, rough skin and mild red spots were observed, but reduced pathological symptoms were recorded in February and March. Some researchers; Islam (1999) [16], Monowara (2003) [17] and Chakma (2002) [18] clinically and histopathologically observed that fishes have been less affected during the months of February and March. Red spots, deep lesion, discoloration, ulceration near anal and pectoral regions were recorded during December and January in fishes

sampled from the GPM and SRCM, which were connected by rough and irregular roads having dirty floors and unhygienic drainage system. As a result, accumulated fishes in the markets were affected by the environmental condition of the fish markets. From the management point of view, Kamal Ranjit market (KRM) seemed to have better than SRCM and GPM. KRM is characterized by much better hygienic conditions having separate clean floor for fishes and most of small indigenous fishes brought to KRM were caught and transported from nearby the Brahmaputra River. As a result, clinically fishes of KR market have better health over than that in other markets. On the other hand, fishes of the SRCM and GPM were separated with a higher percentage of infestation, especially in December and January where most of the fishes were collected from Kailla beel.

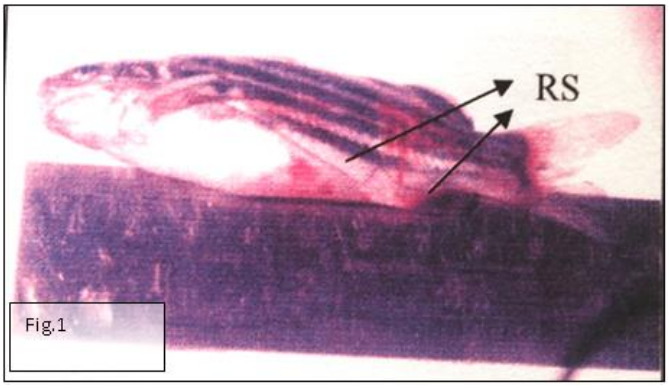

Figure 1. Photograph of *M. vittatus* from fish of KRM market in December.

Besides hygienic and sanitary facilities, the health condition of fishes in SRCM and GPM were found to be affected by transportation time as these fish markets are situated at a much greater distance from Kailla beel. It may be noted here that red spots turned towards deep, subcutaneous lesion and ill health with dark colours were recorded in December and January in fish from the KRM market (Fig.1) in Bangladesh Agricultural University campus.

3.2 Histopathological Study of Fishes

In this section, microscopic studies were centered on gills, skin, liver and kidney of fishes. External organs like gills and skin were severely affected during the month of December and January but observed almost normal in the month of October, November and March from all of fish markets. Internal organs such as, liver and kidney were also severely affected during the months of December, January and February. *M. vittatus* had pathological changes viz., severe necrotic areas, large vacuoles, inflammation and pyknosis during the months of December and January from SRCM and GPM. During this time, severe necrosis and pyknosis with large vacuoles were noted in fish from GPM.

3.2.1 Study on Gills

Fish gill was more affected than the other organs. Both the gill lamellae were hypertrophied; hyperplasia, pyknosis, melano macrophage and missing in some portions having monogenetic trematodes were seen in secondary gill lamellae in *M. vittatus* during the months of December and January from SRCM and GPM. Secondary gill lamellae were partly lost, necrosis, haemorrhage and clubbing in the months of December and January for GPM (Fig. 2). Ahmed and Banu (2001) [19] recorded the presence of trematodes in gills of some small fish indigenous fishes. In the infected gill lamellae, necrosis, pyknosis, clubbing, hypertrophy and hyperplasia were observed by Ahmed *et al.* (1998) [9], Islam *et al*. (1999) [16] and Roy *et al.* (2006) [20].

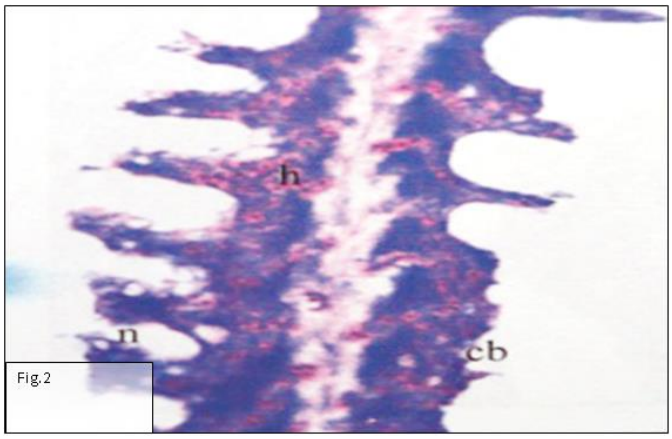

Figure 2. Section of gill of *M. vittatus* in December & January from Gullpukurpar market. Secondary gill lamellae were highly destroyed & necrosis (n) haemorrhage (h) & clubbing (cb) were found. H&E x 440.

3.2.2 Study on Skin

Fish skins were almost healthy and dermis were partly lost in *M. vittatus* from KRM during the month of October to March. In fishes, the epidermis and dermis

were partly lost having haemorrhages and necrosis from SRCM and GPM in the month of October, November, February and March. Well-developed fungal granuloma was found in the affected skin and muscle during the months of December and January from the SRCM and GPM. Noga and Dykstra (1986) [21] were of the opinion that marked granuloma and inflammatory response were shown by fish infected with *Aphanomyces* sp. Hatai *et al.* (1994) [22] also reported fungal hyphae and many granulomas in the internal organs and musculature of EUS affected *Colisa lalia* in Japan. Akter *et al.* (2006) [23] and Roy *et al.* (2006) [20] reported fungal hyphae and many granulomas in the skin and muscle of some small indigenous species. From the present study it was found that epidermis were lost and dermis was spitted into a few parts having fungal granuloma in muscles from GPM in December and January (Fig. 3).

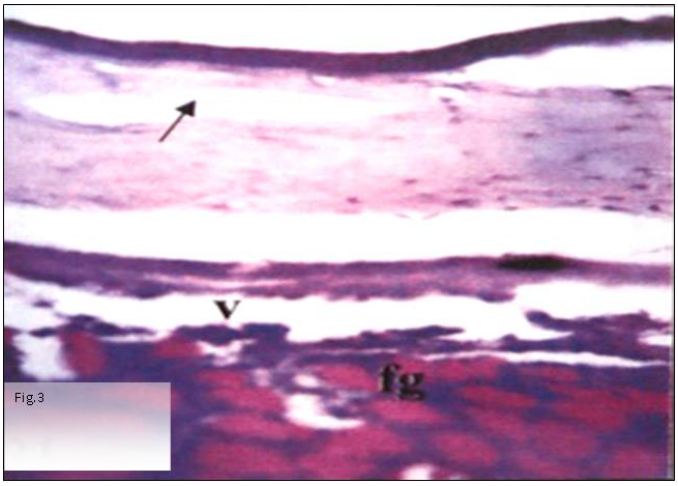

Figure 3. Section of skin & muscle of *M. vittatus* in December & January from Gullpukurpar market. Epidermis and dermis spitted into a few parts (↑), vacuoles (v) & fungal granuloma (fg) were seen in muscle. H&E x 440.

3.2.3 Study on Kidney

The kidney structure had mild hemorrhagic areas in the months of October and November in fishes from KR market and in February and March, large empty spaces were observed in fish from SRCM. However, the histological structures of kidney of *M. vittatus* were seen to have severe necrosis, pyknosis, haemorrhage, vacuoles and fungal granulomas during the months of December and January from SRCM and GPM. Akter *et al.* (2006) [23] observed pronounced changes in the kidney of small indigenous species affected by EUS during the months of December and January. Roy *et al.* (2006) [20] found pathological changes in the kidney tubules of *Mystus vittatus* showing necrosis having wide vacuole, inflammatory cells and pyknotic cells in Ailee beel during the months of December and January.

Joshi *et al.* (2007) [24] and Ahmed *et al.* (2009) [25] observed vacuums, fungal granuloma and hepatic necrosis in kidney. From the present result, it could be mentioned that *M. vittatus* fishes were severely affected having disease like EUS occurred during the months of December and January.

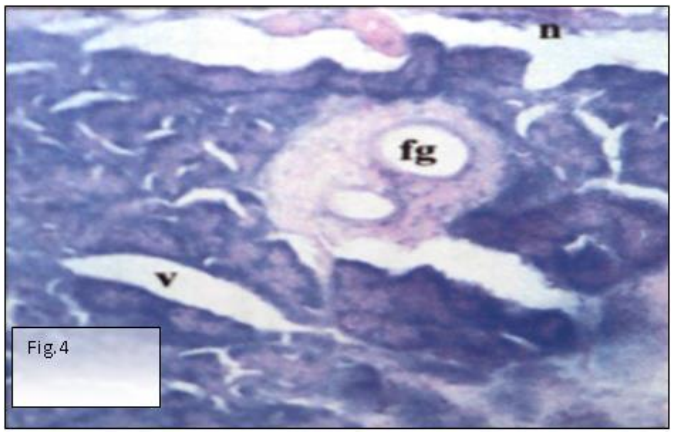

Figure 4. Section of kidney of *M. vittatus* in December & January from Gullpukurpar market. Severe necrosis (n), many vacuoles (v) & fungal granuloma (fg) were seen. H&E x 440.

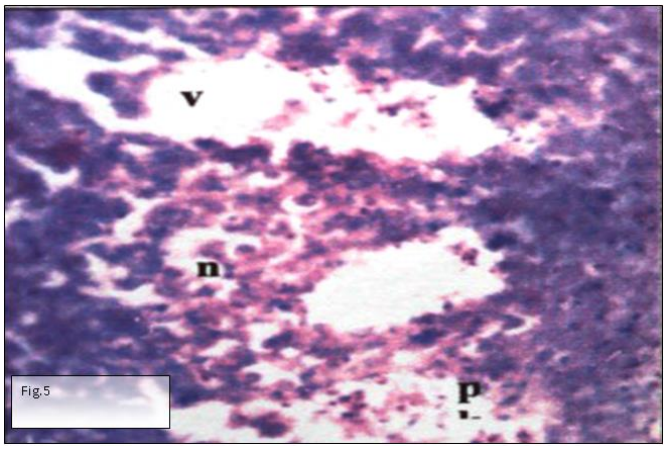

Figure 5. Section of liver of *M. vittatus* in December & January from Gullpukurpar market. Pyknotic cells (pk), severe necrosis (n) & vacuole (v) were seen. H&E x 440.

3.2.4 Study on Liver

Liver of *M. vittatus* was more affected in fishes collected from SRCM and GPM than in KRM during the month of December and January. During the coldest

month, increased number of vacuums, necrosis, pyknosis and haemorrhage were noted in liver of *M. vittatus* compared to sampled fishes in October, November and March (Fig.5). Similar results were observed by Akter *et al.* (2006) [23] and Roy *et al.* (2006) [20], Alam 2004 [26] also found that spleen and liver were swollen and enlarged during the colder months.

IV. CONCLUSION

Clinical and histopathological studies indicated that *M. vittatus* was severely affected by different parasites and pathogens from different markets. *M. vittatus* collected from KR market were less affected than of SRCM and GPM. Most of the small indigenous fishes including *M. vittatus* came from beels in SRCM and GPM. In the KR market retailers collected fishes from adjacent areas of the Brahmaputra river and Ailee beel, Mohanganj. The fishes obtained from different beels had greater chances of exposure to different pesticides, agrochemicals and pollutants, which had deleterious effects on health conditions of fishes. Histopathologically, it was observed that sampled fishes (*M. vittatus)* were almost normal in October and March, but showed minor pathological changes in November and February. However, pronounced pathological changes were noted in different organs of fishes during December and January. Further studies should be undertaken to find out the exact causes of fish disease and to precisely determine the underlying factors behind continual decline of natural fish population in Bangladesh.

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