Ulcer diseases in cultured fish in Mymensingh and surrounding districts

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Abstract

The status of ulcer diseases in cultured fish in 14 upazilas (sub-districts) of Mymensingh and surrounding six districts were investigated during the winter in 2001-2002 and 2002-2003. Fish were visibly affected by ulcer diseases including epizootic ulcerative syndrome (EUS). Prevalence of disease varied in different districts, months and fish species in the two years. The highest prevalence of disease was in Jamalpur district where 90% fish ponds in Melandah upazila were affected during 2001-2002, whereas 80% affected ponds were observed in sadar upazila of Mymensingh district during 2002-2003. The highest prevalence was in January and the lowest in October. The prevalence of ulcer diseases in different fish species varied significantly (p<0.01). Among the 10 affected species, six were histopathologically EUS-positive and four EUS-negatives. *Cirrhinus cirrhosus* and *Barbodes gonionotus* were highly affected by ulcer diseases including EUS. (*Bangl. vet.* 2007. Vol. 25, No. 1. 40-49)

Introduction

Bangladesh is blessed with huge water resources suitable for aquaculture. Fish production is increasing, though Amin (2000) reported that production is substantially hampered due to disease. Diseases in the form of ulcer are often confused with epizootic ulcerative syndrome (EUS), which are more prevalent in winter. Sufficient information is not available to overcome the problem (Chowdhury, 1998; Khan, 2001; Majumder *et al.*, 2001; Rahman and Chowdhury, 1996; Rahman *et al.*, 1998; Sarker *et al.*, 1998). Studies were done in Bangladesh on ulcer diseases of fish by a number of workers with special emphasis on EUS. Majumder *et al.* (2001) suggested that ulcer diseases should be studied in order to take necessary measures against the pathogens. There is anecdotic information on ulcer diseases but very few surveys. The objectives of the present study were to determine the prevalence of ulcer diseases in cultured fish during winter in Mymensingh and its surrounding six districts, as in this part of the country fisheries are important.

Materials and Methods

Selection of study area

Field survey of ulcer diseases was carried out in cultured fish in Mymensingh and its surrounding six districts, Kishoreganj, Netrokona, Sherpur, Jamalpur, Tangail

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and Gazipur. The sampling periods were October 2001 to March 2002 and October 2002 to March 2003, when ulcer diseases in fish commonly occur. Two upazilas were randomly selected from each district. Ten fish culture ponds at different locations within each upazila were selected.

Disease investigation and sampling of fish

A total of 100 fish belonging to different species were caught by seine or cast net randomly and investigated clinically. Among the investigated fish, 10 were randomly sampled considering their disease signs and were immediately brought to the laboratory in the same pond water in a bucket.

Fish with lesions were diagnosed clinically as described by Post (1987) and Tonguthai *et al*. (1999). EUS-affected fish were recognized according to the clinical signs suggested by Roberts *et al*. (1989); Vishwanath *et al*. (1997). Briefly, the signs were: Type-1: early lesions, pinhead-sized red spots on the body surface with no noticeable haemorrhage or ulceration and skin around the spots normal with no discolouration; Type-2: moderately advanced lesions - approximately 2-4 cm diameter raised, circular, discoloured areas on the body surface, and soft with relatively intact skin and scales; Type-3: advanced lesions - circular or oval, open dermal ulcers, usually extending into the skeletal muscle, with large haemorrhagic and necrotic open ulcers on the body surface, devoid of epidermis and scales with loss of dermis.

A pond was confirmed as EUS-positive when at least one fish was found with typical EUS-like mycotic granulomas on histopathology. Ulcer diseases without mycotic granulomas were confirmed as EUS-negative.

Statistical analysis

Analysis of variance was performed using MSTAT program. The mean differences were compared with Duncan's Multiple Range Test (Gomez and Gomez, 1984).

Results and Discussion

During the winter of 2001-2002 and 2002-2003, fish in the investigated ponds in all seven districts were affected by EUS. Haemorrhagic red to yellowish-grey lesions on the body surface were the most common feature (Fig. 1). In severe cases skeletal muscle or viscera were exposed. Fluffy, cotton-like, white to grey or grey to grey-brown growth on the skin, fins, gills or eyes of fish indicated fungal infection. Clinical signs of bacterial disease depended on causative agents. In *aeromonad* septicaemia ulcers were seen on the body surface, tail and fin with erythema at the base of fins. Clinical signs of *pseudomonad* septicaemia included tail and fin rot, opaque eye, scale loss, and haemorrhagic lesions in the skin and at the base of the fins. Clinical signs of *Edwardsiella* septicaemia were red colour on the body surface and abdomen, fins and jaws: sometimes, loss of normal pigmentation, protruding

haemorrhagic anus and opaque eyes were observed. The results obtained in the present study correlate with the findings of Post (1987) and other authors (Roberts *et al.*, 1989; Tonguthai *et al.* 1999; Vishwanath *et al.*, 1997).

Fig. 1. Red lesion on the body surface of *Cirrhina cirrhosus*

Out of 140 ponds investigated, mean (±SD) prevalence of ulcer diseases was 46.4 ± 26.2 in 2001-2002 and 54.3 ± 23.1 in 2002-2003 (Table 1). The prevalence of diseases in affected ponds varied in the two consecutive years.

Table 1. Prevalence of ulcer disease in fish ponds in Mymensingh and surrounding districts

District	Upazila	Year 2001-2002			Year 2002-2003		
		Investigated ponds	Affected ponds	Prevalence of affected ponds (%)	Investigated ponds	Affected ponds	Prevalence of affected ponds (%)
Mymensingh	Sadar	10	7	70	10	8	80
	Trishal	10	6	60	10	7	70
Kishoreganj	Tarail	10	5	50	10	6	60
	Itna	10	4	40	10	5	50
Netrakona	Atpara	10	0	0	10	2	20
	Mohanganj	10	2	20	10	4	40
Sherpur	Sadar	10	2	20	10	3	30
	Nokla	10	3	30	10	3	30
Jamalpur	Melandah	10	9	90	10	9	90
	Motherganj	10	8	80	10	8	80
Tangail	Ghatail	10	7	70	10	8	80
	Bhuapur	10	6	60	10	6	60
Gazipur	Shripur	10	3	30	10	4	40
	Kapasia	10	3	30	10	3	30
Total 7 districts	Total 14 upazilas	140	65	46.4 ± 26.2 (Mean ± SD)	140	76	54.3 ± 23.1 (Mean ± SD)

In both years, the highest prevalence of all ulcer diseases in affected ponds was in Jamalpur district, where 90% was observed in Melandah and 80% in Motherganj upazila. During the year 2001-2002, the second highest prevalence was in Mymensingh

(Sadar 70% and Trishal 60%) and Tangail (Ghatail 70% and Bhuapur 60%). During the year 2002-2003 80% of ponds were affected in Mymensingh (Sadar) and in Tangail (Ghatail). During 2001-2002 no pond was affected in Atpara upazila of Netrakona district, but 20% were affected during 2002-2003. Low prevalence was seen in Sherpur district (20-30%).
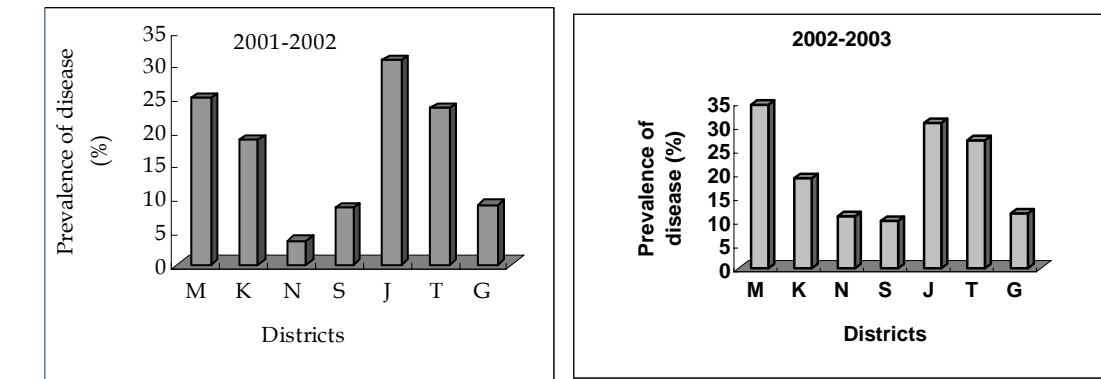

Fig. 2(A, B). Prevalence of ulcer disease cultured fish in Mymensingh and surrounding districts during 2001-2002 and 2002-2003
M = Mymensingh   K = Kishoregonj   N = Netrakona   S = Sherpur
J = Jamalpur   T= Tangail   G = Gazipur
Values with a, ab, b, c, d, e having dissimilar letter (s) differed significantly (p<0.01)

Barua *et al.* (1992) reported EUS from 11 districts in Bangladesh where Bogra district of Rajshahi division and Netrokona district of Dhaka division had the highest prevalence of EUS. The disease has been recurring every year throughout Bangladesh in freshwater fish, presumably due to transmission of aetiological agents.

Prevalence of infection varied significantly (p<0.01) between districts and months (Fig. 2 and Fig. 3). During 2001-2002 prevalence of ulcer diseases in the investigated upazilas ranged from 0 to 67%. The highest mean prevalence of infection was in Jamalpur (30.8%), significantly (p<0.01) higher than in other districts. The second highest mean prevalence was in Mymensingh (25.0%), but it was not significantly (p<0.01) different from that of Tangail district where 23.5% fish were infected. The lowest mean prevalence of infection was in Netrakona where 3.5% fish were infected. Prevalence of infection in Sherpur and Gazipur district differed (8.5-9.0%) insignificantly.

Comparing months, the highest prevalence of infection was in January (34.3%) and the lowest in October (2.1%). Prevalence of disease increased gradually from November and decreased from February (21.4%).

In 2002-2003 the highest prevalence was in Mymensingh (34.5%) and the lowest in Sherpur (10.0%) and Netrakona (11.0%). The second highest prevalence was in Jamalpur (30.7%) followed by Tangail (27.0%), Kishoreganj (19.0%) and Gazipur (11.6%). The prevalence of ulcer diseases in the upazilas ranged from 0 to 68%. As in

the previous year, the mean prevalence of infection was highest in January (40.3%) and lowest in October (2.0%). No significant difference in infection was found between December and February or November and March in both the study years. Disease was significantly (p<0.01) more prevalent in January and February than in other months. The result is in agreement with the findings of Roberts *et al.* (1993) and Khan (2001) who reported that the prevalence of EUS was high during the winter. The syndrome appears to be seasonal (Tonguthai, 1985) and may be associated with environmental factors especially low temperature (Macintosh and Phillips, 1986). Water level of the investigated ponds gradually decreased during the experimental period but the biomass increased causing overcrowding, which might be another predisposing factor for the diseases.
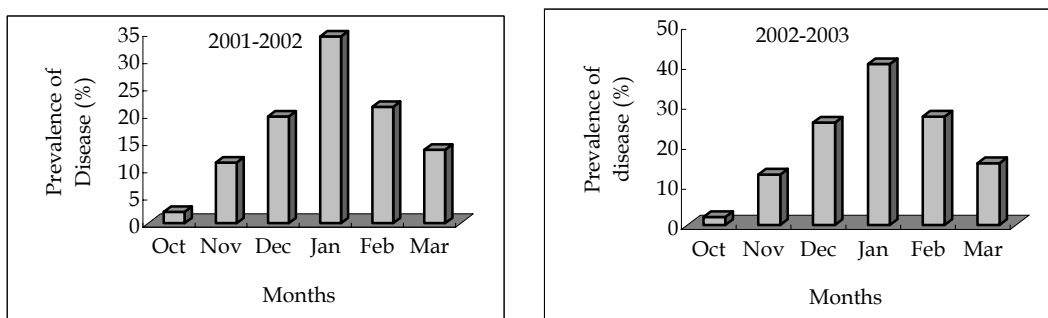

Fig. 3(A, B). Prevalence of ulcer disease outbreak in different months during 2001-2002 and
                2002-2003
Values with a, b, c, d having dissimilar letter (s) differed significantly (p<0.01)

Numbers of fish species affected by ulcer diseases varied significantly (p<0.01) between species and months (Table 2 and Table 3). The investigated cultured fish species were *Barbodes gonionotus, Catla catla, Cyprinus carpio var. communis, Cyprinus carpio var. specularis, Cirrhinus cirrhosus, Ctenopharyngodon idellus, Hypophthalmichthys molitrix, Labeo gonius, Labeo rohita, Morulius calbasu* and *Pangasius hypophthalmus*. Among these 11 species, 10 were affected by ulcer diseases in 2001 -2002, and nine in 2002 - 2003. *C. cirrhosus* and *B. gonionotus* were badly affected: the mean number of affected fish was 798.3 and 732.3, respectively, during 2001-2002 and 915.3 and 851.3, respectively during 2002-2003. Statistically no significant difference (p>0.01) was observed between mean numbers of affected fish of these two species. The second highest affected species were *L. rohita* (327.8) and *C. catla* (271.8) during 2001-2002 and *P. hypophthalmus* (388.3), *L. rohita* (372.5) and *C. catla* (307.7) during 2002-2003. The least affected species during 2001-2002 were *C. carpio var. communis* (0.3), *C. idellus* (0.5), *M. calbasu* (4.8), *L. gonius* (13.7) and *H. molitrix* (14.5), whereas during 2002-2003 the least affected species were *C. idellus* (0.8), *M. calbasu* (9.5), *H. molitrix* (12.5) and *L. gonius* (17.0). No infection was found in *C. carpio var. specularis*. In the present study, *C. cirrhosus* and *B. gonionotus* were severely affected. The less affected species were *C. carpio var. communis, C. idellus, M. calbasu, H. molitrix* and *L. gonius*. Ahmed and Rab (1995) reported that *B. gonionotus* culture ponds were the worst affected (64%) by EUS.

Table 2. Prevalence of ulcer disease in fish species October 2001 to March 2002

Fish species	October		November		December		January		February		March		Mean no. of affected fish	Level of significance
	Examined fish	Affected fish	Examined fish	Affected fish	Examined fish	Affected fish	Examined fish	Affected fish	Examined fish	Affected fish	Examined fish	Affected fish		
B. gonionotus	2865	150 (5.2)	2887	541 (18.7)	2760	777 (28.1)	2802	1427 (50.9)	2723	855 (31.4)	2896	644 (22.2)	732.5	
C. catla	1500	5 (0.3)	1650	134 (8.1)	1553	350 (22.5)	1701	582 (34.2)	1694	392 (23.1)	1542	168 (10.9)	271.8[a]	p<0.05
C. carpio com.	200	0	180	0	150	0	200	2 (1.0)	200	0	180	0	0.3	
C. carpio spec.	100	0	80	0	75	0	100	0	80	0	84	0	0.0	
C. cirrhosus	2060	130 (6.3)	2420	549 (22.7)	2351	894 (38.0)	2270	1527 (67.3)	2395	1015 (42.8)	2456	665 (27.1)	798.5	
C. idellus	500	0	400	0	350	0	200	3 (1.5)	320	0	390	0	0.5	
H. molitrix	3130	0	2990	0	3049	23 (0.7)	3055	25 (0.8)	3173	24 (0.8)	3095	15 (0.5)	14.5	
L. gonius	400	0	300	0	250	10 (4.0)	400	25 (8.75)	350	25 (7.1)	350	12 (3.4)	13.7	
L. rohita	1610	5 (0.3)	1560	172 (11.0)	1819	445 (24.5)	1725	709 (41.1)	1599	400 (25.1)	1523	236 (15.5)	327.8[a]	
M. calbasu	632	0	500	0	400	4 (1.0)	467	15 (3.2)	430	7 (1.7)	459	3 (0.7)	4.8	
P. hypophthalmus	1010	0	1000	164 (15.9)	1040	237 (22.9)	1080	495 (45.8)	1062	262 (24.9)	1025	147 (14.3)	217.5[a]	
Monthly mean no. of affected fish		26.4		141.82[b]		249.09[a]		438.18[a]		271.82[b]		171.82[b]		

[ ] : Figure in the parenthesis indicates the percentage prevalence of infection
Values bearing different superscripts are significantly different (p<0.01)

Table 3. Prevalence of ulcer disease in fish species in different months October 2002 to March 2003

Fish species	October		November		December		January		February		March		Mean no. of affected fish	Level of significance
	Examined fish	Affected fish	Examined fish	Affected fish	Examined fish	Affected fish	Examined fish	Affected fish	Examined fish	Affected fish	Examined fish	Affected fish		
B. gonionotus	2720	110 (4.0)	2795	556 (19.2)	2832	1007 (35.3)	2786	1708 (61.3)	2768	1077 (38.9)	2799	670 (23.9)	851.3	
C. catla	1605	5 (0.2)	1650	164 (9.9)	1604	410 (25.1)	1754	672 (38.4)	1598	420 (26.3)	1580	176 (11.1)	307.7	
C. carpio com.	150	0	195	0	140	0	180	0	190	0	175	0	0.0	
C. carpio spec.	100	0	82	0	86	0	100	0	80	0	83	0	0.0	
C. cirrhosus	2081	110 (5.3)	2372	555 (23.4)	2296	1147 (50.0)	2198	1704 (77.5)	2283	1293 (56.6)	2294	683 (29.8)	915.33	p<0.01
C. idellus	526	0	465	0	396	0	210	5 (2.4)	296	0	402	0	0.83	
R. meklinix	3061	0	2915	0	3007	38 (1.3)	3065	57 (1.20)	3200	0	3274	0	12.5	
L. gonius	420	0	350	0	294	20 (6.8)	399	42 (10.5)	382	27 (7.1)	341	13 (3.8)	17.0	
L. rohita	1724	7 (0.4)	1597	190 (11.9)	1792	495 (27.6)	1698	827 (48.7)	1685	472 (28.1)	1566	243 (15.5)	372.50	
M. calbasu	598	0	554	0	455	13 (2.9)	510	24 (4.7)	465	15 (3.2)	456	5 (1.1)	9.5	
P. hypophthalmus	1012	50	1025	325 (31.7)	1048	460 (43.9)	1100	620 (56.4)	1060	495 (46.5)	1027	380 (37.0)	388.3	
Monthly mean no. of affected fish		25.5		160.91b		326.36b		512.72a		343.46ab		197.27b	-	

( ): Figure in parentheses indicates the percentage prevalence of infection
Values bearing different superscripts are significantly different (p<0.01)

Llobrera and Gacutan (1987) reported that the most severely affected fish in natural outbreaks were some bottom dwellers. The results of the present study correlate with the report of Chowdhury *et al.* (2003) where *C. cirrhosus* and *B. gonionotus* were severely affected. The prevalence of infection was higher in the second year. This may be due to low temperature, which might stress the fish, exposing them to infection.

A total of 167,910 fish belonging to 11 species were examined for ulcer diseases, of which 31,540 (18.8%) were affected (Table 4). Among the 11 fish species, 6 were histopathologically EUS-positive (12.0%) and 4 (6.8%) were EUS-negative. The EUS-positive species were *B. gonionotus, C. catla, C. cirrhosus, L. gonius, L. rohita* and *M. calbasu,* whereas EUS-negative species were *C. carpio var. communis, C. idellus, H. molitrix* and *P. hypophthalmus*. The highest prevalence of EUS was observed in *C. cirrhosus* (4.7%) followed by, *B. gonionotus* (3.9%), *L. rohita* (1.9%), *C. catla* (1.4%), *L. gonius* (0.1%) and *M. calbasu* (0.0%). Non-EUS was higher in *P. hypophthalmus* (2.2%) followed by *B. gonionotus* (1.8%) and *C. cirrhosus* (1.4%). *C. cirrhosus* was EUS-positive followed by *B. gonionotus* while EUS-negative fish were *C. carpio var. communis, C. idellus* and *H. molitrix*. The results obtained correlate with the findings of Sarker (2000) and Khan (2001) who found *C. cirrhosus* and *B. gonionotus* were most affected by EUS. Lilley *et al.* (1992) reported that Indian major carps were much more susceptible to EUS than the Chinese or European carps. Barua (1994) reported that at least 31 different species of fish were affected by EUS and Indian major carps were most commonly affected. Khan (2001) obtained similar results.

Table 4. Prevalence of ulcer disease in fish diagnosed as EUS-positive and EUS-negative

Fish species	Total examined fish	Total affected fish (%)	EUS-positive fish (%)	EUS negative fish (%)
B. gonionotus	33,656	9,502 (5.7)	6,500 (3.9)	3002 (1.8)
C. catla	19,464	3,477 (2.1)	2,375 (1.4)	1102 (0.7)
C. carpio comm.	2,140	2 (0.0)	0 (0)	2 (0.0)
C. carpio spec.	950	0 (0)	0 (0)	0 (0)
C. cirrhosus	27,482	10,282 (6.1)	7,880 (4.7)	2,402 (1.4)
C. idellus	4,455	8 (0.0)	0 (0)	8 (0.0)
H. molitrix	37,217	162 (0.1)	0 (0)	162 (0.1)
L. gonius	4,239	184 (0.1)	126 (0.1)	58 (0.0)
L. rohita	19,892	4,202 (2.5)	3175 (1.9)	1027 (0.6)
M. calbasu	5,916	86 (0.1)	60 (0.0)	26 (0.0)
P. hypophthalmus	12,499	3,635 (2.2)	0 (0)	3,635 (2.2)
Total	1,67,910	31,540 (18.8)	20,116 (12.0)	11,424 (6.8)

( ) : Figures in parenthesis indicate percentages

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