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Parasitic diseases of Indian major carp in Rajshahi district of Bangladesh

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Abstract: The present study was undertaken to determine the parasitic diseases of three Indian major carps in different fish markets of Rajshahi District during March 2006 to February 2007. A total of 288 fishes of Indian major carp *viz. Labeo rohita, Catla catla* and *Cirrhinus cirrhosus* 96 for each species were examined for identifying the parasites. Among the 288 species, 238 fishes were found infected and a total number of 2121 parasites were collected during the study period. Among the parasites, 10 were ectoparasites and the rest four were endoparasites. Protozoan and monogeneans were very common on the gills of the host fishes. In *Labeo rohita* a total number of 10 species were identified of which 8 were ectoparasites and the rest 2 were endoparasites. In *Catla catla* a total number of 11 species were identified of which 8 were ectoparasites and the rest 3 were endoparasites. In *Cirrhinus cirrhosus* a total number of 12 species were identified of which 8 were ectoparasites and the rest were endoparasites. The ectoparasites *M. rohitae* was found only in the host *L. rohita* during the study period. The highest (87.50%) prevalence of parasites was recorded in *L. rohita* and lowest value (77.08%) was recorded in *C. cirrhosus*. The abundance of parasites ranged from 5.95 to 9.00 during the study period. The highest abundance (9.00) was recorded in *L. rohita* and the lowest (5.95) was recorded in *C. catla.* The highest mean density of parasites was observed as 10.28 in *L. rohita* and lowest as 7.15 in *C. catla*.

Key words: Ectoparasites, endoparasites, Indian major carps and parasitic diseases.

Introduction

Carps are considered as the main cultivable species in the inland aquaculture of Bangladesh. Recently it contributes about 85.29% of total pond fish production of Bangladesh (BFRSS, 2005). Along with carps all the freshwater species found more or less to suffer with various types of diseases including Epizootic Ulcerative Syndrome (EUS), septicemia, columnar diseases, tail and fin rot diseases, dropsy, bacterial and parasitic diseases (Chowdhury, 1993). In an investigation on 150 ponds of 40 fish farms (Chowdhury, 1998) reported that skin leisons are the commonest disease incidence (50-60%), followed by EUS (25-30%), tail and fin rot (15-20%), parasit6ic disease (15-20%) and unknown disease (15-20%). Indian major carps like *Labeo rohita, Catla catla* and *Cirrhinus cirrhosus* are the most commonly cultured indigenous freshwater fishes in Bangladesh. They are considered to be among the most economic important fishes of Bangladesh because they have high market demand, nutritious, delicious and their fry and fingerlings are easily available to culture. As the culture of Indian major carps has increased, there has been an increase in incidence of disease outbreak. Indian major carps are highly susceptible to disease in comparison to Chinese and European carps (Lilley *et al*, 1992). Unfortunately very few works is so far known to be initiated on this group of parasite of Indian major carps of Bangladesh. In Bangladesh a large number of works on helminthes parasites of fishes had been carried out in the laboratories of Department of Zoology Dhaka University, Chittagong University, Bangladesh Agricultural University (BAU) and Institute of Biological sciences (IBSc) Rajshahi. The study of fish parasitology is important both from the point of fishery management and control of human and animal diseases for fish caused by fish parasites. Therefore, the present investigation was undertaken to determine the parasitic diseases of three Indian major carps under Rajshahi district, Bangladesh.

Materials and Methods

Selection of host Fishes: Three species of Indian major carp Rohu (*Labeo rohita*), Catla (*Catla catla*) and Mrigel (*Cirrhinus cirhossus*) were selected as host specimen for the present study. Twenty-four species of each host fishes were collected randomly per month and a total number of 288 species were examined during the study period from March 2006 to February 2007 in different fish markets of Rajshahi District.

Collection of Specimen: Live or fresh dead fishes were collected randomly every week at a regular interval. Fishes were collected from various fish markets of Rajshahi District. Sometimes fish species were also collected directly from different farmers' culture ponds.

Collection of parasites

External observation: The external surface of the host body was examined by a magnifying glass to find out ectoparasites if any on the skin, scales, fins or any kind of leisons such as ulcers, raised scales, reddened fins, cyst and injuries resulting from physio-chemical agents. Parasites were collected with the help of fine brush and preserved in individual vials and kept for identification. Then gills were removes from the branchial cavity and placed in a petridish containing saline solution. The gills were carefully separating to dislodge the live monogeneans and usually placed under a microscope for gross observation (Plate 1 and 2).

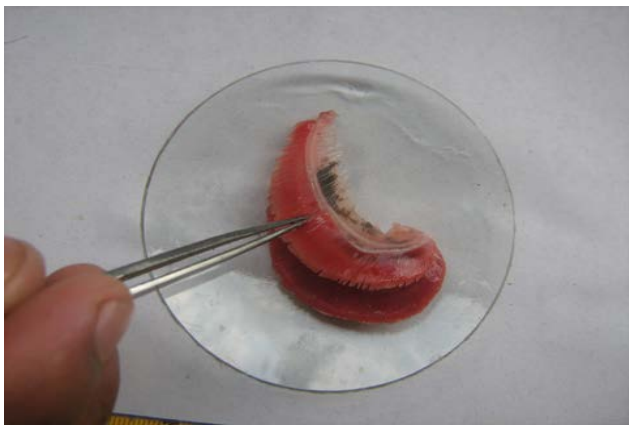

Plate 1. The infected gill of the host specimens

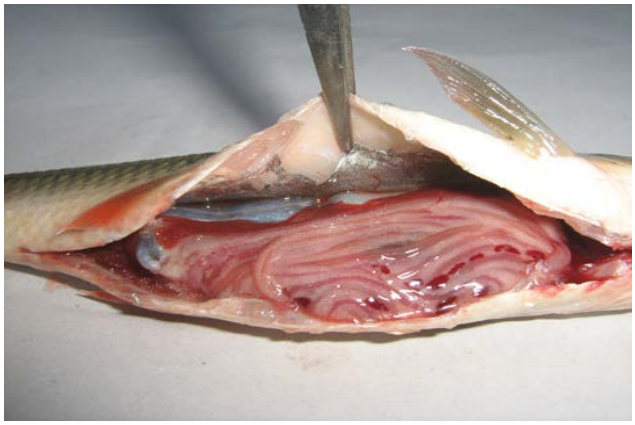

Plate 2. The internal organs of the host specimens after dissection

Internal observation: To collect the endoparasites, the fishes were dissected and internal organs were examined. The viscera were removed from the body by an incision through the mid ventral longitudinal line. The viscera were put into physiological saline solution (0.7% Nacl Solution) in a Petri dish (Plates 3 and 4). Then the internal organ like stomach, liver, intestine etc. were separated and kept in separate Petri dishes with saline solution. Each organ was then examined separately for parasites. The stomach and intestine were split open and were shaken in a tube to dislodge the parasites remaining attached to the epithelial lining. Sometimes the epithelial layer of stomach and intestine were scraped with a scalpel to remove the parasites. When the fishes were dissected without keeping in the refrigerator often the parasites come out it from the organs. The collected parasites in Petri dishes were then washed in fresh saline solution. The contents were stirred well and allowed to settle in the bottom of the Petri dishes. The supernatant liquid was removed carefully with a dropper. Washing was repeated until the supernatant liquid became clear. Then the sediment together with distilled water examined under a microscope. The aforementioned procedure was followed for each individual specimen.

Plate 3. Picking up the internal organs of the host specimens for examine of parasites

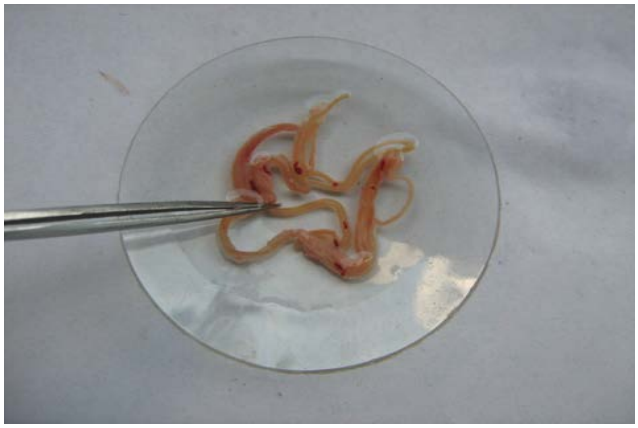

Plate 4. Photograph showing the scrapping of intestine for examines parasites

Fixation of collected parasites

The collected parasites were sorted out into different groups. Different methods of fixation were employed for different groups of parasites. Mostly the parasites were fixed in 2ml of Formalin acetic alcohol (FAA) solution and heated on spirit lamp at 70-75^{o}C**.**

Cleaning of parasites: Parasites were removed from Formalin acetic acid solution and carefully washed with 70% alcohol.

Identification of parasites

Collected parasites were identified according to the "Systema Helminthum' by Yamaguti (1963), vol, 1, Part-II, "Fish Parasitology" by Kirtonia Juran Chandra (2004) and some ectoparasites were identified according to "Fish Disease and Solution" published by Fisheries Research Institute (FRI) Mymensingh.

Prevalence, abundance and mean density were determined following the keys of (Margalef, *et.al.* 1982) as follows:

$$1.\ \text{Prevalenc} = \frac{\text{Number of infected host}}{\text{Total number of host examined}} \times 100$$

$$2.\ \text{Abundance} = \frac{\text{Number of parasites}}{\text{Total number of host examined}}$$

$$3.\ \text{Mean density} = \frac{\text{Number of parasites}}{\text{Total number of infected host}}$$

Results

A total of 288 fishes of Indian major carp viz. *Labeo rohita*, *Catla catla* and *Cirrhinus cirrhosus* (96 from each) were examined for identifying the parasites. Out of 228 observed fishes a total number of 238 fishes were found infected and a total number of 2121 parasites were collected during the study period. Among the collected parasites a total of 14 species were identified of which 10 were ectoparasites and the rest were endoparasites. Protozoan and monogeneans were very common on the gills of the host fishes. In *Labeo rohita* a total number of 10 species were identified of which 8 were ectoparasites and the rest 2 were endoparasites. In *Catla catla* a total number of 11 species were identified of which 8 were ectoparasites and the rest 3 were endoparasites. In

Cirrhinus cirrhosus a total number of 12 species were identified of which 8 were ectoparasites and the rest were endoparasites. The ectoparasites *M. rohitae* was found only in the host *L. rohita* during the study period (Table 1).

Table 1. Distribution of parasites in three Indian major carps

Host fish	Type of Parasite	Recovered Parasites	Site of Infestation
L. rohita	Ectoparasites	*Dactylogyrus vastator*	Gill
		Trichodina pediculatus	Skin, Gill
		Argulus foliaceus	Skin, Fin
		Gyrodactylus elegans	Skin
		Chilodonella cyprini	Gill, Skin
		Ichthyobodo necatrix	Skin, Fin
		Ichthyopthirius multifilis	Skin, Fin
		Myxobulus rohitae	Gill, Skin
	Endoparasites	*Cammalanus ophiocephali*	Intestine
		Fellodistomum agnotum	Stomach
C. catla	Ectoparasites	*Dactylogyrus vastator*	Gill
		Apiosoma sp.	Skin, Fin
		Trichodina pediculatus	Gill
		Argulus foliaceus	Skin, Fin
		Gyrodactylus elegans	Skin
		Ichthyobodo necatrix	Skin, Gill
		Ichthyopthirius multifilis	Gill, Fin
		Larnaea sp.	Gill and Fin
		Fellodostomum agnotum	Stomach
	Endoparasites	*Cammalanus ophiocephali*	Intestine
		Eucreadium sp.	Intestine
C. cirrhosus	Ectoparasites	*Dactylogyrus vastator*	Gill
		Apiosoma sp.	Skin, Fin
		Trichodina pediculatus	Gill
		Argulus foliaceus	Skin, Fin
		Gyrodactylus elegans	Skin
		Ichthyopthirius multifilis	Skin and Fin
		Chilodonella cyprini	Skin
		Larnaea sp.	Gill, Skin
		Pallicentis ophiocephali	Intestine
	Endoparasites	*Cammalanus ophiocephali*	Intestine
		Eucreadium sp.	Intestine
		Fellodistomum agnotum	Stomach

Comparative infestation of *L. rohita, C. catla* and *C. cirrhosus*: During the study period the highest (87.50%) Prevalence of parasites was recorded in the host *L. rohita* and lowest value 77.08%was recorded in *C. cirrhosus*. The abundance value was ranged from 5.95 to 9.00 during the study period. The highest abundance value (9.00) was recorded in the host *L. rohita* and the lowest (5.95) was recorded in *C. catla.* The highest mean density of parasites was observed as 10.28 in *L. rohita* and lowest as 7.15 in *C. catla*. A second peak of mean density was found as 9.25 in the host *C. cirrhosus* (Table 2).

Comparative Prevalence (%), Abundance and Mean density in different seasons

The prevalence of infestation was fluctuated during the study period. The highest prevalence value (87.50%) was found in *L. rohita* and *C. catla* and the lowest value (75.00%) was in *C. cirrhosus.* In rainy season, *C. catla* and *C. cirrhosus* showed the highest (87.50%) prevalence value where *L. rohita* showed least prevalence values (84.37%). But in winter, the highest prevalence (90.62%) was recorded in *L. rohita* and lowest value recorded in *C. cirrhosus*. The abundance of parasites was fluctuated among these seasons. The highest abundance value (9.84) was found in *C. cirrhosus* in summer where the season where *C. catla* shows lowest abundance value (6.71).In rainy season, *L. rohita shows* the highest (8.12) abundance value where *C. catla* showed second peak value (7.46) and *C. cirrhosus* showed lowest value (6.75). In winter, the highest abundance value (9.65) in *L. rohita* and the lowest (3.68) value found in *C. catla*. *C. cirrhosus* showed the highest mean density (13.12) in summer where *C. catla* showed lowest mean density (7.67). In rainy season, *L. rohita showed* the highest (9.62) mean density of parasites where lowest value recoded in *C. cirrhosus* as 7.71. In winter, highest mean density recorded in *L. rohita* as 10.65 and lowest value found in *C. catla* as 4.91 (Table 3).

Table 2. Comparative infestations of *L. rohita, C. catla* and *C. cirhosus* by different groups of parasites

Host fish	No. of host fish		No. of Parasites collected	Prevalence (%)	Abundance	Mean Density
	Examined	Infested				
L. rohita	96	84	864	87.50	9.00	10.28
C. cirrhosus	96	74	685	77.08	7.13	9.25
C. catla	96	80	572	83.33	5.95	7.15

Table 3. Comparative Prevalence (%), Abundance and Mean density of three host fishes in different seasons

Host fish	Prevalence (%)			Abundance			Mean density		
	Summer	Rainy	Winter	Summer	Rainy	Winter	Summer	Rainy	Winter
L. rohita	87.50	84.37	90.62	9.21	8.12	9.65	10.53	9.62	10.65
C. catla	87.5	87.50	75.00	6.71	7.46	3.68	7.67	8.53	4.91
C. cirrhosus	75.00	87.50	68.75	9.84	6.75	4.81	13.12	7.71	7.00

Discussion

Different parasites were found in the different organs of the host fishes. The highest number of parasites was observed in the skin of *L. rohita* and lowest number of parasites was found in the intestine of *Catla catla*. The study reveals that the observed host fishes are mostly infested by the skin parasites, which indicate the food prevalence and distribution pattern of parasites itself. Among the three hosts the parasite *Myxobulus rohitae* was found only in the skin of the *L. rohita*. Similar observation was reported by Sanaullah and Ahmed (1980) and Ahmed (1982). On the other hand, the ectoparasites *Apiosoma sp.* was found only in the skin and fin of *C. catla* and *C. mrigala* but the another ectoparasites *Larnaea sp.* was found in gill, skin and fin of *C. catla* where it was found in gill and skin of *C. cirrhosus.* Banu *et. el.* (1993 and 1999) and Chowdhury (1993) reported these parasites in some exotic fishes. *Pallicentis ophiocephali* was found only in

the intestine of the *Cirrhina mrigala*. *Eucreadium sp.* was found only in the intestine of *C. catla* and *C. cirrhosus.* Similar result was reported by Anon (1974), Chandra (1985), Chandra and Golder (1987) in snakehead fishes, *N. nandus*, *O. pabda* and *X. cancila*. During the study period, prevalence, abundance and mean density were fluctuated in the observed three host fishes in different seasons. The highest prevalence was found in *L. rohita* and lowest in *C. cirrhosus* during winter. The highest mean density was found in *C. cirrhosus* in summer and lowest in *C. catla* in winter. The highest abundance was found in *C. cirrhosus* in rainy season and lowest in *C. catla* in winter. Seasonal changes in nature are very clearly reflected in organic life. Chubb (1977) worked on seasonal occurrences of monogeneans of freshwater fishes. In the present experiment seasonal occurrence in prevalence, abundance and mean intensity of infestation were found through out the year but did not follow any distinct cycle. Lyaiman (1940) noted that the peak season of prevalence is summer and lowest in rainy season. The result concluding that influence of temperature on the immune system of hosts responsible for degree of infestation. The result is followed by Kabata (1985) who stated that the fishes are susceptible to disease in low temperature and low metabolic activity. Mohanta (1998) found that *Puntius sp.* was more infested by parasites in winter than summer season. The similar result was found by Akhter *et.al. (*1997), Banu. *et. al* (1993) and Chandra *et. al. (*1997). Chandra (1987) reported that the unfavorable environmental or ecological conditions caused variety of fish diseases. Jhingran and Pulling (1985) noted that fish were susceptible to a wide range of parasites and diseases when under stress from poor environmental condition and inadequate feeding. On the other hand, the highest mean density and abundance was observed in summer and rainy season respectively in *C. cirrhosus*. During the present investigation, the infestation exhibited seasonal fluctuations; in general it was maximum in winter and minimum in rainy season among three host fishes. The prevalence of infestation was fluctuated during the study period. The highest prevalence (90.62) was found in *L. rohita* in winter where *C. catla* showed the highest prevalence value (87.50) both in summer and rainy season and *C. cirrhosus* showed highest value (87.50) in rainy season. The lowest prevalence value of *L. rohita* was found as 84.37 in rainy season where the lowest prevalence value was found in winter both in C. *catla* and *C. cirrhosus* as 75.00 and 68.75 respectively. The host *L. rohita* showed the highest abundance value (9.65) in winter and lowest (8.12) in rainy season where the highest (7.46) and lowest (3.68) abundance value was recorded in *C. catla* both in rainy and winter season. On the other hand, the highest (9.84) and the lowest (4.81) abundance value of *C. cirrhosus* were recorded in summer and winter respectively. In case of mean density, *L. rohita* showed the highest value (10.65) in winter and the lowest (9.62) in rainy season where in *C. catla* it was found highest (8.53) and the lowest (4.91) respectively in rainy and winter season. On the other hand, the highest (13.12) and the lowest (7.00) mean density value of *C. cirrhosus* was recorded in summer and winter respectively. The result clearly indicates the seasonal mode of parasitic infestation among the host fishes. Though the fishes are cultured together in a water body but their infestation is not same in different season. During the study period, *L. rohita* found to be infected mostly in winter, *C. catla* in rainy and *C. cirrhosus* in summer season.

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