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ENDOPARASITIC INFESTATION IN *Channa punctatus* COLLECTED FROM DIFFERENT WATER BODIES IN SYLHET

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Abstract

The present study was conducted to determine the endoparasitic infestation and their effects on the growth of *Channa punctatus* from different water bodies in Sylhet during the period from January to May 2013. Six different species of parasites identified from the hosts examined were i). *Euclinostomum multicaecum*, ii). *Allocreadium handiai*, iii). *Genarchopsis dasus*, iv). *Isoparorchys hypselobagri*, v). *Camallanus intestinalus*, and vi). *Pellisentis ophiocephali*. Moderate infestations were found in *C. punctatus* due to parasites. Prevalence was different in different months. The highest prevalence observed in January (75.00%) and lowest in February (55.56%). Changes in the nature of growth and loss of weight as a result of parasitic infestation were noticed. Accordingly length, weight and condition factors were found greatly affected. Loss of total length was 2.68%. The loss of weight and condition factor was 10.45% and 0.03, respectively. The loss of gonad weight also observed in infested male and female host and it was 5.25% and 3.64%, respectively.

Key words: Endoparasitic infestation, *Channa punctatus*, haor

Introduction

Parasites are important groups of organisms since it evolved independently in nearly every phylum of animals, from protozoa to arthropods and chordates, as well as in many plant groups. Fish parasitology is a rapidly developing field of aquatic science. This is due to the growing importance of aquaculture, concerns on pollution effects on fish health and a generally increasing interest in environmental biology (Moller and Anders, 1986). It is now universally accepted that parasites present a continual and unaccepted threat to the well being of millions of people of the globe specially the people of the tropics and subtropics and to domesticate animals in all parts of the world. In any natural environment the parasites remain normally in a complex dynamic equilibrium with the free living communities of plants and animals (Hoffman, 1967). Parasitic diseases, either alone or in conjunction with other environmental stresses, may influence weight or reproduction of the host, alter its population characteristics, and affect its economic importance (Rhode, 1993). The host species for this study was *Channa punctatus* which belongs to order Channiformes and family Channidae. These fishes are known as "Zeol fish" (Shafi and Quddus, 1982). These are commercially important fishes in our country and comparatively cheap too. The parasitic fauna associated with *Channa punctatus* may vary due to excessive use of inorganic fertilizers and pesticides in cultivated lands, discharge of industrial effluents, inadequate waste disposal etc. which can indirectly cause changes in the aquatic environment. Parasites occupy a definite position in the animal kingdom for their remarkable adaptations and damaging activities to host. The importance of parasite is related directly to the fish that may affect the general public health (Hoffman, 1967). Every parasite living in or on a fish extent some degree of harmful influence on its host. The normal growth of fish is interrupted or inhibited if they are heavily infected with parasites. The composition of the parasites of fish depends on various environmental factors such as geographical location of the habitat, season of the year, physico-chemical factors of the water, the fauna present in and around the habitat etc. Dogiel (1964) suggested factors that directly influence parasitic fauna of fish include age, diet, abundance of fish, interdependence of members of parasitic fauna within the fish and the season. The normal growth of the fishes is impeded if they are heavily infested with endoparasites. According to Gupta (1983) injury of fishes can carry heavy infection of parasites that cause deterioration in the food of fish and may even result in their mortality. Besides there are a number of "helminth parasites" which are transmitted to man only through fishes. The similarity in parasitic fauna between species utilizing similar food was also noted (Dogiel, 1964). The difference in feeding habits has considerable impact on intestinal parasites, but related species living together are likely to share a similar array of ectoparasites, in spite of their differences. Study of parasites is scant and recent in Bangladesh. Attempts have been taken to explore the parasitic fauna of fishes of this country (Rahman, 1989; Khan, 1985; Ahmed and Rouf, 1981). So the

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main purpose of the present work was to see the prevalence and intensity of endoparasites as well as variation of infestation in male and female fishes (*C. punctatus*) from different water bodies in Sylhet.

Materials and Methods

Sampling

The host fish species of *Channa punctatus* were collected from different haors and markets from Sylhet during the period from January to May 2013. Live and fresh fishes were brought to the Disease Laboratory, Department of Fish Health Management, Sylhet Agricultural University, Sylhet for investigation.

Parasitological studies

The measurements of total length (TL), standard length (SL), head length (HL), body weight (BW) and gonad weight (GW) of fish were done by centimeter scale and the electric balance, respectively. Then the fishes were dissected in order to collect the endoparasites. An incision was made along the mid-ventral line of the fish. The surfaces of the visceral organs, body cavities and serous membranes were examined for encysted larvae and parasites using hand lens. All of the organs were removed intact and carefully from the body and put into formalin solution in petridishes. After separating, the internal organs (stomach, intestine, liver and body cavity) were examined individually for parasite in separate petridishes with formalin solution. The stomach and intestine were carefully opened by an incision and then were shaken to dislodge the parasites that might remain attached to the lining of the epithelium by their head ends. The epithelial layers of the stomach and intestine were scrapped with a scalpel to remove any parasite that might remain attached to the layers, and the liver and body cavity were shredded with a pair of forceps and needles. The collected parasites were then washed by fresh saline solution. The contents of each petridish were then stirred well and allowed to settle in the bottom of the petridish. The sediment was then examined with a dissecting microscope. The collected parasites were washed by fresh water to clean any debris before making temporary mounts or permanent slides. For the purpose of fixation of nematode and acanthocephalan parasites hot glacial acetic acid and AFA (Alcohol Formalin Acetic) were used, respectively. The collected parasites were placed in hot fixative and left there for a few minutes. After fixation, the parasites were preserved in 70% ethyl alcohol in vials for prolonged storage. Lactophenol was used in order to clean the nematodes and acanthocephalan parasites. The nematodes were kept in lactophenol for five to seven days for visibility of the internal organs. The acanthocephalans required four to five days to be cleaned of in lactophenol. The clean parasites (nematodes and acanthocephalans) were mounted on slides temporarily in lactophenol. To make permanent slides of acanthocephalan the parasites were stained with borax carmine for one and half to two hours and then after dehydrating in alcohol graded series of 35%, 50%, 70%, 85%, 95% and 100%, the parasites were cleaned with xylene and mounted in Canada balsam.

The collected parasites were identified following Yamaguti (1959), Mackiewicz (1981), Hafeezullah (1993), Chandra (2008) and Ash *et al.* (2011).

Infestations were analyzed following Margolis *et al.* (1982).

$$\text{i) Prevalence (\%)} = \frac{\text{No. of host fish infested}}{\text{No. of host fish examined}} \times 100$$

$$\text{ii) Mean intensity} = \frac{\text{No. of the parasites collected}}{\text{No. of the infested hosts}}$$

$$\text{iii) Abundance} = \frac{\text{No. of the parasites collected}}{\text{No. of the hosts examined}}$$

Results and Discussion

During the period of investigation six (6) species of parasites of different groups could be collected and identified. The list of the collected parasites is presented in Table 1.

Allocreadium handiai Pande, 1937

Body elongated with rounded anterior and posterior ends, 3.07-3.82×0.47-0.68 mm. Cuticle smooth. Oral sucker subterminal and 0.23-0.31 mm diameter. Pharynx well developed. Oesophagus short with 0.05-0.06 mm. It bifurcates into two intestinal caeca which extending up to posterior extremity of body. Ventral sucker rounded, pre-equatorial,

larger than oral sucker, 0.19-0.25 mm in diameter. Testes two situated in the hind region of body. Ovary pretesticular and lies behind acetabulum and measurea 0.16-0.22×0.09-0.12 mm. Excretory pore terminal, leads into a long tubular excretory bladder which extended up to middle of posterior testis. Madhavi (1980) found *A. handiai* from *Channa sp*. in Waltair, India. Khan *et al.* (1991) and Ramasamy *et al.* (1998) also found similar parasite from *Channa sp.*

Table 1. List of collected parasites with site of infection

SL. No.	Group	Species	Site of Infection
01	Digenea	*Allocreadium handiai* Pande,1937	Intestine
		Euclinostomum multiceacum Tabangui and	Stomach, Intestine
		Masilungun, 1935	Stomach, intestine
		Generchopsis dasus Gupta, 1951	Liver, stomach
		Isoparorchis hypselobagri Billet, 1898	
02	Nematode	*Camallanus intestinalus* Bashirullah, 1974	Intestine
03	Acanthocephala	*Pallisentis ophiocephali* Thapar, 1931	Stomach, Intestine

***Euclinostomum multicaecum* Tabangui and Masilungun, 1935**

Body medium and elliptical elongated 3.12-4.68 × 1.15-1.77 mm. Oral sucker small, surrounded by collar like fold when retracted measures 0.43-0.48 × 0.55-0.57 mm. Pharynx absent, caeca more or less sinuous wall, opening into excretory vesicles by a very narrow passage. Acetabulam well developed, larger than oral sucker, 0.5 6-1.12×0.78-0.93 mm. Testes two and irregular, anterior testis larger, 0.19-0.22×0.22-0.56 mm. Ovary small circular, situated between two testes and measures 0.09-0.12 mm diameter. Excretory vesicle small, v-shaped. Ramasamy *et al.* (1998) observed *E. multiceacum* while the parasite was roughly distributed on liver and intestine of *C. punctatus*. *E. multiceacum* also had seen by Khan *et al.* (1991) and Ghani and Bhuiyan (2011) when they worked with *C. punctatus* and *L. ruhita*.

***Genarchopsis dasus* Gupta, 1951**

Body muscular, cylindrical with rounded ends, 2.54-3.78 × 0.93-1.05. Oral sucker subterminal. Pharynx absent. Oesophagus absent. Intestinal caeca broad and wabey with several marked constriction, extending beyond the vitellaria where they united. Acetabulam larger than oral sucker situated at middle and measures 0.71-0.87 × 0.71-0.87mm. Testis lie behind acetabulum. Vesicular seminalis curved and intracaecal. Ovary post testicular, closed to right testis, 0.19-0.25 × 0.25-0.34mm. Eggs large, numerous with filament, 0.04-0.05 × 0.02mm. Vitellaria consisted of two large compact glands, situated asymmetrically in extreme posteror part of body within the level of intestinal caeca. Chandra *et al.* (2011), listed down *G. dasus* from different fish species in Mymensingh region of Bangladesh.

***Isoparorsis hypselobagri* Billet, 1898**

Body elliptical and large dorsoventrally flattened, 2.49-26.55 × 0.34-9.63mm. Oral sucker subterminal, acetabulum larger than oral sucker and measures 0.576-6.05 × 0.53-5.96 mm. Prepharynx absent. Esophagus almost indistinguishable. Intestinal cecae of several windings extending to near posteror end of body. Teates two, symmetrically located, adjacent to behind the acetabulum. Testes almost equal, 0.09-3.61 × 0.09-3.60 mm. Ovary band like lying transversly. Uterus long, convoulating, slightly extending beyond intestinal caeca. Vitellaria consists of several subdivided branches over reaching caeca laterally. Excretory vesicle Y-shaped and terminal. Chandra *et al.* (2011) and Khan *et al.* (1991) found *C. punctatus* are heavily infested with *I. hypselobagri*.

***Camallanus intestinalus* Bashirullah, 1974**

Male: Body 2.03-4.95 mm long, 0.09-0.27 mm wide; buccal capsule 0.06-0.09 × 0.09-0.1 mm; with two lateral valves, each with 15-25 ridges, tridents with equal arms, occasionally middle one long; oesophagus divided into two parts, anterior muscular 0.28-0.45 mm long, posterior glandular 0.29-0.49; tail 0.05-0.12 mm long, conical, caudal papillae pedunculate, 14-16 pairs, 6-8 preanal, 2 adanal, 6 post anal.

Female: Body 1.98-11.92 mm long, 0.12-0.52 mm wide; buccal capsule 0.07-0.50.05-0.16 mm and as in male; tridents also as in male; oesophagus, anterior 0.16-0.66mm long, posterior 0.28-0.87; tail 0.28-1.45 mm long, with rounded tip; valve post-equatorial, conspicuous, 2.17-6.82 from anterior end. Ghani and Bhuiyan (2011), Chandra *et al.* (2011), observed *C. intestinalis* in *C. punctatus* in different region of Bangleadeh. Ramasamy *et al.* (1998) also found similar parasite from *Channa sp.*

***Pallisentis ophiocephali* Thapar, 1931**

Male: Size of body is 5.0-6.0 × 0.28-0.35 mm. Size of the proboscis is 0.14 × 0.22 mm. Length of the proboscis sac is 0.66 × 0.22 mm. Length of neck gland is 1.62 mm. There are two testes with length of the anterior testis is 0.60-0.66 and the posterior testis is 0.35-0.66 mm.

Female: Size of body is 8.0-14.0 × 0.195 mm. Size of the proboscis is 0.175 × 0.242 mm. Length of the proboscis sac is 0.935 × 0.22 mm. Length of the neck gland is 2.32 mm. Size of eggs is 0.068 × 0.025 mm. Khalil *et al.* (2013) and Khan *et al.* (1991) observed *P. ophiocephali* from *H. fossilis* and *C. punctatus* respectively.

Monthly infestations

During the period of investigation 85 *Channa punctatus* were examined. Among them 57 fish were infested with 174 parasites of different species. The nature of infestations due to infection of parasites on to host is presented in Table 2. From where prevalence was found 64.23% and mean intensity were recorded 3.05. From the monthly infestation it was observed that maximum number of parasite was collected from the host in January and minimum in February. The maximum prevalence (75.00%) was in the month of January and minimum prevalence was in February 55.56%. On the other hand, the highest mean intensity was recorded in January (3.25) followed by April (3.23) and May (2.98). However, lower level of intensity was recorded in February (2.86). Chhanda (2011) observed highest prevalence (100%) and mean intensity (25.94) in December and lower in August in *Clarias batruchus*. Similar results also observed by Laboni (2011). Kennedy (1969) observed that factors such as distribution and environment of the host, the diet and mode of feeding, often play important role to limit a parasite to a particular host species as well as higher prevalence occur in a particular season.

Table 2. Parasitic infestations in *C. panctatus* in different months in 2013

Months	No. of host examined	Prevalence (%)	Mean intensity	Abundance	SD
January	20	75.00	3.25	2.57	1.21
February	18	55.56	2.86	1.94	1.53
March	15	60.00	2.91	2.21	1.32
April	17	70.59	3.23	2.56	1.38
May	15	60.00	2.98	2.64	1.23
Total	85	64.23	3.05	2.38	1.33

- *Significant at 5% level of probability*

Changes in the nature of growth (Length)

The experimental fishes were first differentiated as infested and uninfested and their average total lengths were presented in Table 3 and their differences noted as 0.45 and the percentage loss of length was 2.68. Desbrosses (1948) found that the whiting infested with *Lernaeocera* showed a retardation in growth. Kabata (1958) noticed no such effects in the haddock parasitised by *Lernaeocera*. Sproston and Hartely (1941) were on the opinion that parasites showed a selective infestation of larger fishes.

Table 3. The average total length (TL) of uninfested and infested *C. panctatus* and the percentage of loss of length

SL. No.	Infested or Uninfested	Number Examined	Mean length (cm)	Loss of length (cm)	% Loss of length
1.	Uninfested	28	16.80±2.01	-	-
2.	Infested	57	16.35±2.05	0.45	2.68

Changes in the nature of growth (Weight)

During the period of investigation both the uninfested and infested host fish *C. punctatus* were weighted. The average weight of the uninfested hosts were 49.30±17.07g and the average weight of the infested hosts were 44.15±15.02g. Due to parasitic infestation the difference of weight was 5.15 g and the percentage loss of weight was 10.45 also shown in Table 4. It appeared that there was a noticeable loss of weight of the host fish as a result of infestation of parasites after applying t-test at 5% level of significance. Loss of weight as a result of crustacean infections has been observed by Lechler (1935), Mann (1964), Goregyad (1955), Grabda (1957) and Kabata (1958). Most of the authors expressed the view that there was a considerable loss of weight in fishes when parasites were present in larger numbers.

Table 4. The average weight of uninfested and infested fish with the percentage loss of weight

SL. No.	Infested or uninfested	Number Examined	Mean weight (g)	Loss of weight (g)	% Loss of weight
1	Uninfested	28	49.30±17.07	-	-
2	Infested	57	44.15±15.02	5.15	10.45

Changes in the nature of growth (Condition factor)

During the study a total of 85 *C. punctatus* were examined where 28 fish were uninfested and 57 were infested with parasites. The condition factor of uninfested and infested fishes is presented in Table 5 and it was cleared that the uninfested fish had higher condition factor (1.04) than infested ones (1.01). Similar finding was observed by Mann (1953) and Kabata (1958) in case of attack of *Lernaeocera*. Almost identical observations were made by Sproston and Hartely (1941). Das *et al.* (1997) described the mean values of condition factor and relative condition factor were 1.0755 and 1.0144 for fish culture. When the values are in less than the mean values then the fishes fall in alarming situation due to parasitic infestation.

Table 5. Condition factor of uninfested and infested parasites in *C. panctatus*

Parameter	Uninfested	Infested	Loss of condition factor
Mean length (cm)	16.80±2.01	16.35±2.05	-
Mean weight (g)	49.30±17.07	44.15±15.02	-
Condition factor	1.04	1.01	0.03

Changes in the nature of growth (Gonad)

A total of 85 hosts were examined where 55 were male and 30 were female. The average weights of gonad in uninfested and infested male were 0.95±0.19 g and 0.90±0.15 g, respectively. The percentage loss of gonad weight was 5.26. The average weight of gonad in uninfested and infested female was 1.65±0.95 g and 1.59±0.71 g, respectively. The percentage loss of gonad weight was 3.64 (Table 6). Zama (1988) showed significant difference in gonad weight between infested and uninfested *Austromedia smitti* and recorded 4.25% loss of gonad weight for parasitic infestation.

Table 6. The average weight of gonad in infested and uninfested male and female

SL. No.	Sex	No. of examined fish	Gonad weight of Uninfested fish	Gonad weight of infested fish	% Loss of gonad weight
01	Male	55	0.95±0.19	0.90±0.15	5.26
02	Female	30	1.65±0.95	1.59±0.71	3.64

The investigation was conducted for five months and a marked difference was found between infested and uninfested fish. The nematode and digenetic trematode was dominant among other groups of parasite. Prevalence and intensity were moderate in host fish. Total length, body weight, gonad weight and condition factor were lost due to parasitic action in infested fish. However the study should continue for one year for better understanding of the parasitism and effects of parasite on host.

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