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# Prevalence of *Genarchopsis dasus* (Digenea: Hemiuridae) in *Channa punctatus* of Mymensingh

K. J. Chandra*, M. Hasan and S. S. Basak
Department of Aquaculture, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

## Abstract

An investigation was made on prevalence of the parasite *Genarchopsis dasus* in the fish *Channa punctatus* of Mymensingh, Bangladesh to determine the infestation and seasonal variation. The experiment was carried out from December 2009 to November 2010. A total of 379 parasites were collected from 235 host fish. The prevalence of *G. dasus* was higher in July and lower in September and October. The highest prevalence (83.3%) was in rainy season and the lowest (45.5%) in autumn. The highest intensity of *G. dasus* was in July and the lowest in December, and the highest and lowest intensity was in rainy and winter seasons, respectively. The prevalence was highest in intermediate length fish (67.0%), where the lowest (54.9%) was in small fish. Intensity was highest in intermediate length fish. The higher prevalence (90%) and intensity (4.3) was in female during rainy season. The lower prevalence (32%) and mean intensity (1.1) was in male during autumn. The highest ratio of mature: immature was in summer (30 : 37), the highest percentage of mature worms was in summer and the highest proportion of immature worms in autumn. The stomach contained most worms (72.8%) and the lowest proportion (6.6%) was in anterior portion of intestine. (*Bangl. vet*. 2011. Vol. 28, No. 1, 47 – 54)

## Introduction

Snakehead (*Channa* genus) is an important group of freshwater fish in Bangladesh. It is carnivorous, fed mainly on animal foods (Chandra and Haq, 1986). Due to its feeding habit, this fish can act as an intermediate or a final host for many helminth parasites. Infestations are harmful for fish health. The infestations cause high mortalities when their life cycles are well supported by intermediate hosts. The helminth parasites mainly found in freshwater fish are trematodes, cestodes, acanthocephalans and nematodes, which complete their life cycles through intermediate hosts like snails and fish-eating birds (Chandra, 2004). For successful prevention and elimination of such parasitic infestations, it is important to study prevalence and intensity of infestation in fish with mode of infestation including the larval stages of parasite.

Several studies have been done on Taki (*Channa punctatus*) fish. Most of these are in the area of biology, reproduction of this fish (Srivastava and Singh 1994), and a few of them include histopathology of diseased fish (Chandra, 1998; Afroz *et al*., 1999).

* Corresponding author:- *E-mail*: kirtuniajchandra@yahoo.com

*Genarchopsis* is a common genus of parasite with several species that infest Channid fish in the Indian subcontinent. Alam *et al.* (2010) studied parasites of *Channa punctatus* and listed seven species of parasites, including *Genarchopsis bangladeshensis*.

Banerjee (1992) studied Digenean parasites of freshwater fish of Mymensingh and described the morphology of *Genarchopsis dasus,* infesting *Channa punctatus*. No work so far has been initiated on population biology of *Genarchopsis dasus.* The distribution in different seasons of the year and the biology and development within the host organisms is not known.

The present study was undertaken to explore (i) the prevalence and mean intensity of infestation with *Genarchopsis dasus*, (ii) the seasonal variation of such infestation in relation to sex and size and (ii) the distribution in the digestive tract.

## Materials and Methods

The experimental fish were collected from water bodies and fish markets of Mymensingh monthly from December 2009 to November 2010. Fish were brought to the fish disease laboratory and divided into small, <17 cm length; medium, 17.1 - 20 cm and large >20 cm. A total of 235 fish were examined 85 male and 150 female.

The fish were opened along the mid ventral line from the anal region to the mouth. The surface of the visceral organs, mesenteries and body cavity were examined carefully. The alimentary canal was separated and kept in petri dishes containing water. The stomach and intestine were opened. To dislodge parasites, the organs were scraped by scalpel. The parasite was fixed as described by Chandra (2008). The parasite was processed and cleared through glycerine jelly. Some permanent whole mounts were prepared. Identification of parasites was as done described by Yamaguti (1958) and Chandra (2008).

The year was divided into four seasons: winter (December - February), summer (March - May), rainy season (June - August) and autumn (September - November). Infestations were calculated following Margolis *et al.* (1982) as the intensity (total number of individuals of a particular parasite species in a sample of a host species ÷ number of infested individuals of the host species in the sample), and the abundance (total number of individuals of a particular parasite species in a sample of hosts ÷ total number of individuals of the host species [infested + uninfested] in the sample).

## Results and Discussion

*Monthly distribution (Prevalence, intensity and abundance)*

The parasites were found throughout the year but the highest prevalence (100%) was observed in July and the lowest (40%) in September - October. The highest and lowest intensity were 6.6 ± 2.7 and 1.5 ± 0.3 in July and May, respectively (Table 1). The prevalence and intensity of infestation of *G. dasus* were significantly ($P<0.5$) different in different months.

*Seasonal distribution of Genarchopsis dasus*

Prevalence, intensity and abundance of parasites varied with seasons. Prevalence and intensity were highest during rainy season. In autumn, prevalence and intensity were lower. The abundance was higher in rainy season (Table 2, Fig. 1). The prevalence and intensity of infestation of *G. dasus* were significantly (P<0.5) different in different seasons.

Table 1. Monthly distributions of *Genarchopsis dasus* from December 2009 to November 2010

| Months | No of host examined | No. of host infested | No. of worms recovered | Prevalence (%) | Intensity | Abundance | SD for intensity |
|---|---|---|---|---|---|---|---|
| December | 20 | 12 | 16 | 60 | 1.3 | 0.8 | 0.12 |
| January | 20 | 10 | 20 | 50 | 2.0 | 1.0 | 0.51 |
| February | 20 | 14 | 25 | 70 | 1.8 | 1.3 | 0.51 |
| March | 20 | 11 | 19 | 55 | 1.7 | 1.0 | 0.17 |
| April | 20 | 14 | 30 | 70 | 2.1 | 1.5 | 0.31 |
| May | 20 | 12 | 18 | 60 | 1.5 | 0.9 | 0.30 |
| June | 20 | 14 | 29 | 70 | 2.1 | 1.5 | 0.82 |
| July | 20 | 20 | 132 | 100 | 6.6 | 6.6 | 2.65 |
| August | 20 | 16 | 46 | 80 | 2.9 | 2.3 | 0.42 |
| September | 20 | 8 | 14 | 40 | 1.8 | 0.7 | 0.25 |
| October | 20 | 8 | 16 | 40 | 2.0 | 0.8 | 0.29 |
| November | 15 | 9 | 14 | 60 | 1.6 | 0.7 | 0.30 |

Table 2. Prevalence, intensity and abundance of *G. dasus* in different seasons

| Seasons | No. of hosts examined | No. of host infested | Prevalence (%) | No. of worms collected | Intensity | Abundance |
|---|---|---|---|---|---|---|
| Winter | 60 | 36 | 60.0 | 61 | 1.7 | 1.0 |
| Summer | 60 | 37 | 61.7 | 67 | 1.8 | 1.2 |
| Rainy | 60 | 50 | 83.3 | 207 | 4.1 | 3.5 |
| Autumn | 55 | 25 | 45.5 | 44 | 1.8 | 0.8 |

*Infestation of G. dasus in different size groups of the host*

The prevalence, intensity and abundance varied with size of the host. The highest prevalence, intensity and abundance were observed in intermediate group, and the lowest prevalence in small fish (Table 3). In case of intensity and abundance, both were lower in larger fish.

*Seasonal distribution of G. dasus in different sexes of host*

In winter the higher prevalence, intensity and abundance were in female host. In summer the higher prevalence, intensity and abundance were in male host. In rainy season and autumn the higher prevalence, intensity and abundance were in female host (Table 4).

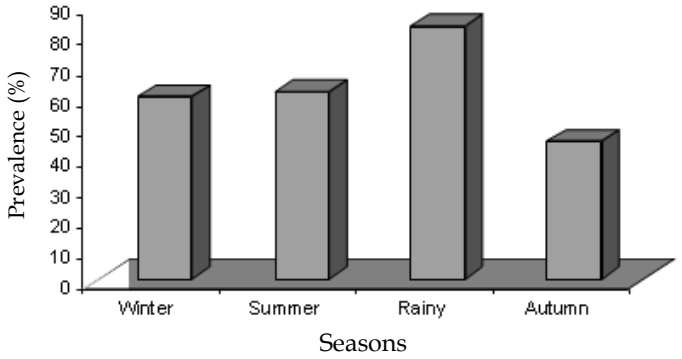


Fig. 1. The prevalence of *G. dasus* in different seasons

Table 3. Infestation of *G. dasus* in different size groups of host

| Size group (cm) | No. of host | | Total no. of parasite recovered | Prevalence (%) | Intensity | Abundance |
|---|---|---|---|---|---|---|
| | Examined | Infested | | | | |
| < 17 | 51 | 28 | 71 | 54.9 | 2.5 | 1.4 |
| 17.1-20 | 118 | 79 | 222 | 66.7 | 2.8 | 1.9 |
| >20 | 66 | 41 | 86 | 62.1 | 2.1 | 1.3 |

Table 4. The prevalence, mean intensity and abundance of *G. dasus* in different sexes in different seasons

| Seasons | Sexes | No. of host | | No of worms collected | Prevalence (%) | Mean Intensity | Abundance |
|---|---|---|---|---|---|---|---|
| | | Examined | Infested | | | | |
| Winter | Male | 21 | 10 | 15 | 47.6 | 1.5 | 0.7 |
| | Female | 39 | 26 | 46 | 66.7 | 1.8 | 1.2 |
| Summer | Male | 19 | 14 | 27 | 73.7 | 1.9 | 1.4 |
| | Female | 41 | 23 | 40 | 56.1 | 1.7 | 1.0 |
| Rainy | Male | 20 | 14 | 52 | 70.0 | 3.7 | 2.6 |
| | Female | 40 | 36 | 155 | 90% | 4.3 | 3.9 |
| Autumn | Male | 25 | 8 | 9 | 32.0 | 1.1 | 0.4 |
| | Female | 30 | 17 | 35 | 56.7 | 2.1 | 1.2 |

*Seasonal distribution of G. dasus in the gut of the host*

*Genarchopsis dasus* was distributed throughout the alimentary canal of the host. The highest number of worms was collected from the stomach (n = 276) and from intestine (n = 103). Within the intestine the highest number of worms was in posterior portion and the lowest in anterior portion (Fig. 2).

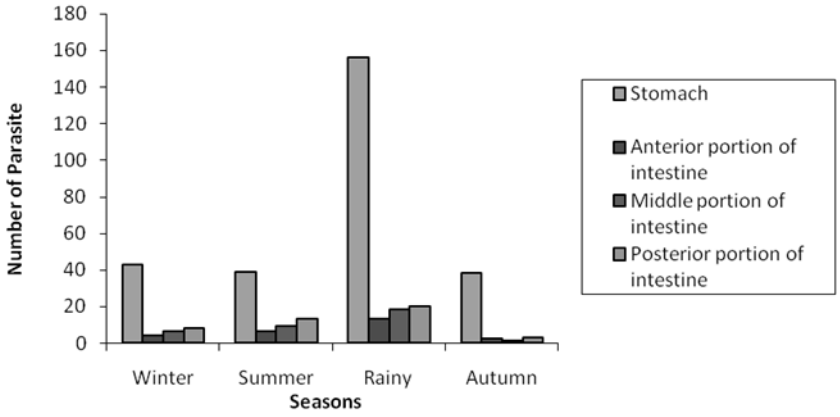


Fig. 2. Seasonal distribution of *G. dasus* in stomach and intestinal parts

*Maturity and development of G. dasus in different seasons*

The maximum numbers of immature and mature worms were in the rainy season. The distribution of mature and immature worms is shown in Table 5 and Fig. 3.

Table 5. The distribution of mature and immature worms in different seasons

| Seasons | No. of parasites collected | Mature | Immature | % mature | % immature | Ratio (mature /immature ) |
|---|---|---|---|---|---|---|
| Winter | 61 | 19 | 42 | 31.2 | 68.9 | 0.5 |
| Summer | 67 | 30 | 37 | 44.8 | 55.2 | 0.8 |
| Rainy | 207 | 67 | 140 | 32.4 | 67.6 | 0.5 |
| Autumn | 44 | 12 | 32 | 27.3 | 72.7 | 0.4 |

*Percentage of G. dasus in the stomach and intestine of the host*

The maximum number of worms (72.8%) were in stomach: 6.6% were in anterior intestine, 9.0% in the middle and 11.6% in the posterior intestine (Fig. 4).

The present study was conducted to know the population biology and infestation of *Genarchopsis dasus* in *Channa punctatus* in Mymensingh district. The infestations differed according to month, season and size of host. The prevalence and intensity depend on many factors like parasite species, host's feeding habits and the water body

the fish inhabit. They also depend on the presence of intermediate hosts such as snails and fish-eating birds. Carnivorous fish were more susceptible to infestation because their food contains larval worms. Feeding habit of host changes with age and environment. Many parasites complete their life cycle by using fish as host of developing larval stage. Digenetic trematode was common group of fish parasite, which can infest the fish either in adult or in larval condition. Many use more than two hosts to complete their life cycle. In adult stage, they infest mainly the internal organs like stomach, liver, intestine and body cavity. During the rainy season, parasitic infestation was high. Similar findings were noticed by Banu *et al.* (1993); Hossain *et al.* (1994); Akhter *et al.* (1997); Chandra *et al.* (1997). This could be due to temperature, low metabolic activity and suppression of natural immune system of fish. Fish are susceptible to a wide range of parasites and diseases when under stress from poor environment and inadequate feeding.

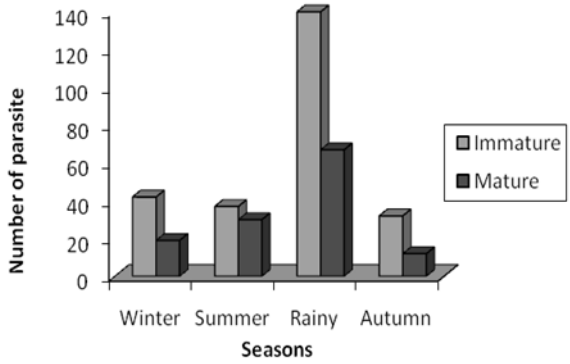


Fig. 3. Maturity of *G. dasus* in different seasons

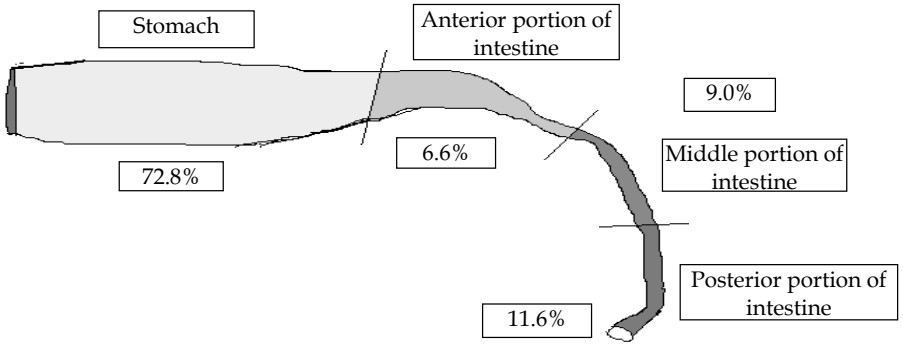


Fig. 4. Percentage distribution of *G. dasus* in stomach and in different parts of intestine

In the present study, the fish were highly infested with the digenetic trematode *G. dasus*. The prevalence and intensity of parasite varied from 40 - 100% and 1.3 - 6.6, respectively, all the year together with 0.7 - 6.6 abundance. The prevalence, intensity and abundance were higher in July. It might be due to the temperature, which has

greater influence on reproduction of parasites. Hasan *et al.* (2006) found that parasitic infestation was more severe at 20.5 - 32.3°C temperature and 7.7 - 8.5 pH.

Prevalence and intensity of infestation were higher in rainy season and lower in autumn, in agreement with Steinauer and Font (2003), who stated that abundance and prevalence peaked in summer. In rainy season, as the fish start to reproduce they become weak and eat feed with metacercacia. *G. dasus* reproduces throughout the year but in rainy season becomes more dominant in host. The infestation of *G. dasus* was higher in middle-sized (17.1 - 20 cm) fish, similar to the findings of Shakir *et al.* (2005), who stated that the mean intensity was higher in 31 - 60 cm fish than 61 - 90 cm fish. Malek and Mobedi (2001) stated that the prevalence was high in middle length host. It could be due to middle-length fish taking more food containing this parasite (Das, 2003).

Alam *et al.* (2010) stated that the prevalence and the intensity were higher in female, similar to the findings of present study. In the present study the infestation was higher in female fish than males. The female fish may be more susceptible to parasitic infestation. Aloo *et al.* (2004) stated that the main reason for the differences in parasitic load with sex is physiological.

The highest numbers of mature and immature worms were in rainy season. The ratio of mature and immature worm was maximum (0.8) in summer and the minimum (0.4) in autumn. The maximum number of worms was in the stomach, and in intestine the highest number was in posterior portion. It might be due to ingestion of parasite along with metacercaria in fish, which accumulates in the stomach until matures, when they move into intestine. Chowdhury (1992) collected *Genarchopsis* sp. mainly from stomach.

These findings indicated a clear seasonal variation of infestations of the parasite in the host fish along with distribution in the alimentary canal. The invasion and maturation of the parasite as correlates with the availability of intermediate hosts and its control measures may be initiated when infestations become harmful to the host fish.

## References

Afroz T, Nabi MR, Mustafa G 1999: The morphohistology of alimentary canal of Chapila, *Gudusia chapra*. *Bangladesh Journal of Zoology* **27** 51-55.

Akhter M, D'Silva J, Khatun A 1997: Helminth parasite of *Anabas testudineus* in Bangladesh. *Bangladesh Journal of Zoology* **25** 135-138.

Alam MJ, Rakibuzzaman M, Hasan MM 2010: Comparative study of endo-parasite infestation in *Channa punctatus* collected from Hatchery Sewage lagoon. *Natural Sciences* **8** 152-156.

Aloo PA, Anam RO, Mwagni JN 2004: Metazoan parasites of some commercially important fish along the Kenyan Coast, Western Indian Ocean. *Journal of Marine Science* **3** 71-78.

Banerjee M 1992: *Studies on Digenean parasites of certain freshwater fishes of Mymensingh*. MS Thesis. Department of Fisheries Biology and Limnology, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh, Bangladesh pp. 92.

Banu ANH, Hossain MA, Khan MH 1993: Investigation into the occurrence of parasites in carps, catfish and tilapia. *Progressive Agriculture* **4** 11-16.

Chandra KJ 1998: The anatomy and histology of the alimentary tract of perch, *Perca fluviatilis* (L.). *Progressive Agriculture* **9** 157-62.

Chandra KJ 2004: *Fish Parasitology*. Published by K Ray Choudhury, 34/A/2 Ram Babu Road, Mymensingh, Bangladesh pp. 179.

Chandra KJ 2008: *A Practical Text Book of Fish Parasitology and Health Management*. The Bangladesh University Grants Commission, Agargaon, Sher-e-Bangla Nagar, Dhaka, Bangladesh pp. 213.

Chandra KJ, Haq MS 1986: Food and feeding habits of freshwater fish of Bangladesh. A review: *Bangladesh Journal of Agricultural Sciences* **13** 63-78.

Chandra KJ, Islam KZ, Wotten R 1997: Some aspects of association and development of *Lystocestus indicus* Moghe in catfish, *Clarias batrachus*. *Bangladesh Journal of Fisheries Research* **1** 31-38.

Chowdhury AK 1992: *Helminth parasite infestation of histopathological changes in snake-head fishes*. MSc Thesis. Department of Zoology, University of Dhaka, Bangladesh.

Das AK 2003: *Investigation into the parasite infestation of three exotic fish species of Bangladesh*. MS Thesis. Department of Aquaculture, Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh, Bangladesh pp. 94.

Hasan M, Ahmed MK, Hafiz F, Hussain AMI, Parveen S, Tinni SR 2006: Load of heterotrophic and nitrifying bacteria in the sewage lagoon and receiving river Buriganga. *Bangladesh Journal of Microbiology* **23** 93-97.

Hossain MA,Banu ANH, Khan. MH 1994: Prevalence of ectoparasite in carp nursery operation of greater Mymensingh. *Progressive Agriculture* **5** 39-44.

Malek M, I. Mobedi I 2001: Occurrence of *Clinostomum complanatum* (Rudolphi**,** 1819) (Digenea: Clinostomatidae) in *Capoeta capoeta gracilis* (Osteichthys: Cyprinidae) in Shiroud river, Iran. *Iranian Journal of Public Health* **30** 95-98.

Margolis L, Esch GW, Holmes JC, Kuris AM, Schad GA 1982: The use of Ecological Terms in Parasitology (Report on an ad-hoc Committee of the American Society of Parasitologists). *Journal of Parasitology* **68** 131-133.

Shakir HA, Khan MA, Abid M 2006: The prevalence of cestode infection in a freshwater catfish, *Sperata sarwari*. Department of Zoology, Punjab University, Punjab, *Punjab University of Journal of Zoology* **21** 41-47.

Srivastava SJ, Singh R 1994: Seasonal changes in the testes of a freshwater murrel, *Channa punctatus*. *Naturalia* **19** 119-130.

Steinauer ML, Font WF 2003: Seasonal dynamics of the helminth of bluegill (*Lepomis macrochirus*) in a subtropical region. *Journal of Parasitology* **89** 324-328.

Yamaguti S 1958: *Systema Helminthum.* Interscience publishers, New York, USA Vol. I, The Digenetic Trematodes of Vertebrates, Part I and II, pp. 979 & 1575.