© 2017 IJSRSET | Volume 3 | Issue 1 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section : Science and Technology

Intensity of Parasitic Infestation in Freshwater Snake Head (*Channa punctatus*) of Belai Beel, Gazipur, Bangladesh in Winter Season

Md. Rayhanur Rahman[1], Dinesh Chandra Shaha[1], Bhaskar Chandra Majumdar[2*], Tasmina Akter[1], Hosne Ara Khatun[1]

[1]Department of Fisheries Management, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh
[2]Department of Fisheries Technology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh.

ABSTRACT

An investigation was made on the intensity of parasitic infestation in freshwater snake head *channa punctatus* of Belai beel of Gazipur district to determine intensity of infection, density of infection, index of infection and prevalence of parasitic infestation. The study was carried out in winter season from November 2016 to January 2017. A total of 98 parasites were collected from 52 host species (*Channa punctatus*). All parasites were belonged to five groups viz. cestode, trematode, nematode, acanthocephala and crustaceae of eight species (*Senga* sp., *Clinostomum* sp., *Euclinostomum* sp., *Cammalanus* sp., *Pallisentis* sp., *Echinorynchus* sp., *Argulus* sp., *Larnaea* sp.). During the study period the highest intensity of infection was found in nematode (1.67) and the lowest intensity of infection was found in both trematode and crustaceae (1.00). On the other hand, the highest density of infection was found in acanthocephala (0.30) and the lowest density of infection was found in crustacean (0.05). In contrast, the highest index of infection was found in nematode (48.75) and the lowest index of infection was found in crustaceae (0.17). In this study the highest incidence of infection was found in nematode (75%) and the lowest incidence of infection was found in crustaceae (5.76%). Out of eight species six were endoparasites and two were ectoparasites. Most of the parasites were found in intestine.

Key words: Intensity, Infestation, *Channa punctatus*, Belai Beel.

I. INTRODUCTION

Snakehead (*Channa*-genus) is an important group of freshwater fish in Bangladesh. It is carnivorous, fed mainly on animal foods (Chandra et al., 1997). The word 'helminth' is a general term meaning 'worm', but there are many different types of worms. Three major assemblages of parasitic helminths are recognized: the nemathelminthes (nematodes) and the platyhelminthes (flatworms), the latter being subdivided into the cestoda (tapeworms) and the trematoda (flukes). Due to its feeding habit, this fish can act as an intermediate or a final host for many helminthic parasites. Infestations are harmful for fish health. Parasite is an important group of pathogen causes infection and diseases of fish both in freshwater and marine environments. With the increasing interests in aquaculture parasitic infestations are becoming threats for fish health management and aquatic fish production throughout the world. The infestations cause high mortalities when their life cycles are well supported by intermediate hosts. Among the fishes is the most important host for maintenance of mainly helminthes. The helminth parasites mainly were found in freshwater fish's viz. trematodes, cestodes, acanthocephalans and nematodes, which complete their life cycles through intermediate hosts like snails and fish-eating birds (Chandra, 2004).

For the present study fish samples were collected from Belai beel. Turag River renamed as Balu River near Pubail Bazar and the main stream flows northward and one branch of Balur River directly connected with the Belai Beel. This branch carries polluted water from Turag River to Relai beel in winter season. Urbanization

and industrialization near the bank of Turag River has been created pollution problem. The most pollution sources of Turag river water are various consumer goods industries (soap and detergent), garments industries, pharmaceuticals industries, lots of tanneries, dyeing industries, aluminum industries, battery manufacturing, match industries, ink manufacturing industries, textile, paint, iron industries, pulp and paper factories, chemical factories, frozen food factories and steel workshop etc. Most of the industries discharge their effluents directly or indirectly into the Turag River without any treatment causing pollution of the surface water. Moreover, many sewerage and municipal sewage drainage system have become a dumping ground of all kinds of solid, liquid and chemical waste that are polluted the river bank. Aquatic pollution is still a problem in many freshwater and marine environments. In addition to effects on free-living organisms pollutants are also affect the health of parasites and consequently their occurrence and distribution. In recent years there is increasing awareness that parasitism should be investigated in the light of the respective environmental conditions (e.g. MacKenzie et al., 1995; Lafferty et al., 2004). Some studies show that pollution can favour or decrease parasitism depending on an uncountable number of interacting variables. Parasites as well as pollutants are also affecting the endocrine system of organisms. A number of substances alter levels of different hormone groups such as sex hormones (endocrine disrupters, e.g. Fent, 2007) or stress hormones (adrenalin, cortisol or corticosteron, e.g. Wendelaar-Bonga, 1997). In parallel, parasites influence sex hormone levels (Hecker & Karbe, 2005) and stress hormones (Sures et al., 2001).

Several studies have been done on biology and reproduction of Taki (*Channa punctatus*) fish (Srivastava and Singh, 1994), and a few of them include histopathology of diseased fish (Chandra, 1998; Afroz et al., 1999). The various fisheries development programs depends on the successful fish parasitological research, as the improvement of fish yield can mainly be achieved from healthy fish stock. Therefore, the present study was undertaken to explore intensity, density, index and prevalence of parasitic infestation for successful prevention and elimination of parasites.

II. METHODS AND MATERIAL

A. Study Location and Sampling

A total of 52 individuals of Channa punctatus were collected. The experimental fishes were collected from Belai Beel of Gazipur district in winter season from November 2016 to January 2017. The samples were then transferred to the laboratory of Department of Fisheries Management, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur.

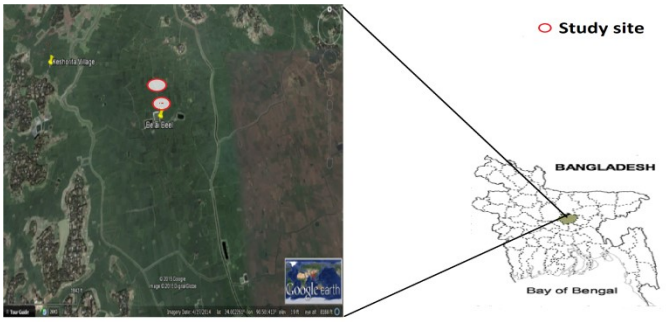

Figure 1: The study area, Belai Beel.

Experimental Procedure:

Fish samples were taken in live condition killed using needle and examined immediately for parasitological study by using compound microscope. A clean spatula was dragged on the body of each individual backwards from the head gently and lifting off a small amount of mucous from the different sites of the body for investigating ectoparasites from skin. Later on, mucous scrapings placed on a clean glass slides for each sites and examined under the 4x, 10x and 40x lenses of the compound microscope for observing the presence of parasites. In gill biopsy, a fine pair of scissors was used to cut and open the operculum from both sides to reveal the opercular cavity. Gill filaments were taken out by cutting off the two ends of the gill arches, and kept on petridishes.

Furthermore, small sample of gills was made by splitting up gill filaments using fine scissors and observed under microscope. Each fish was dissected with a fine scissors used to make an incision along the mid-ventral line of the body to find out the parasites from the internal organs. All other organs (stomach, heart, liver, kidney, spleen and gall bladder) were shredded by using forceps and needles, and separated from intestine. The intestines were carefully opened out

by an incision from the body and put into a petridishes. Sometimes larger nematodes (roundworms) were visible in naked-eyes lying in the body cavity with their heads buried in the intestines and were quickly isolated using forceps. Some parasites are virtually transparent, smaller in size and unable to move from target organs. In that case, we had to scan slowly by adjusting the microscope condenser power from higher to lower. And viewed the saline solution under dark-filled to identify parasites present in the target organs. Microscopic picture of all the isolated parasites were taken by converted microscope as well as high megapixel camera and the parasites were identified by the image analysis (Miah et al., 2013).

B. Analysis of Parasitic Infestation

The analysis of parasitic infestation for finding the incidence, intensity, density and index of infection were carried out by following formulae (Margolis et al., 1982):

$$\text{Incidence of infection} = \frac{\text{Infected host} \times 100}{\text{Total host examined}}$$

$$\text{Intensity of infection} = \frac{\text{No.of parasites collected in a sample}}{\text{No.of infected host}}$$

$$\text{Density of infection} = \frac{\text{No.of parasites collected in a sample}}{\text{Total host examined}}$$

$$\text{Index of infection} = \frac{\text{No.of host infected} \times \text{No.of parasites collected}}{\text{Total host examined}}$$

III. RESULTS AND DISCUSSION

A. Results

Identification of Parasite:

In this study a total of 98 parasites of 8 species were collected from the host fish Channa punctatus. Out of eight species six species were endoparasites and two parasites were ectoparasites (Table 1). Two crustacean parasites viz. Argulus sp. and Lernaea sp. were found in skin of infected fish. One species of cestode (Senga sp.), two species of trematode (Clinostomum sp., Euclinostomum sp.), one species of nematode (Camallanous sp.), and two species of acanthocephalan (Pallesentis sp. and Echinorynchus sp.) were found from host fish.

Table 1: Organ-wise distribution of parasites observed in Channa punctatus

Types of parasites	Name of parasites	Groups of parasites	Infected organ
Endoparasites	Senga sp.	Cestode	Intestine
	Clinostomum sp.	Trematode	Intestine
	Euclinostomum sp.	Trematode	Intestine
	Cammalanus sp.	Nematode	Intestine
	Pallisentis sp.	Acanthocephala	Intestine
	Echinorynchus sp.	Acanthocephala	Intestine
Ectoparasites	Argulus sp.	Crustaceae	Skin
	Larnaea sp.	Crustaceae	Skin

Parasitic Infestation

The intensity, density, index, incidence (%) of infection are shown in Table 2. The highest intensity of infection was found in nematode (1.67) and the lowest intensity of infection was found in trematode and crustaceae (1.00).On the other hand, the highest density of infection was found in acanthocephala (0.30) and the lowest density of infection was found in crustacean (0.05).In contrast the highest index of infection was found in nematode (48.75) and the lowest index of infection were found in crustaceae (0.17). In this experiment the highest incidence of infection was found in nematode (75%) and the lowest incidence of infection was found in crustaceae (5.76%).

Table 2: The fluctuations of overall incidence (%), intensity, density and index of parasites in Channa punctatus

Parasite groups	Number of fish examined	No of infected host	No of collected parasite	Intensity	Density	Index	Incidence
Cestode	52	5	8	1.60	0.15	0.77	9.6
Trematode	52	6	6	1.00	0.11	0.70	11.53
Nematode	52	39	65	1.67	0.25	48.75	75
Acanthocephala	52	10	16	1.60	0.30	3.07	19.23
Crustaceae	52	3	3	1.00	0.05	0.17	5.76

B. DISCUSSION

In this experiment cestode parasite (senga sp.) trematode parasites (Clinstomum sp. and Euclinostomum sp.), nematode parasite (Camallaneous sp.) and crustacean parasite (Lernaea sp. and Argulus sp.) were found. A total of 98 parasites are collected from 52 host species. Most of the parasites were found in intestine only Larnaea sp. and Argulus sp. were found in skin. This may be Gazipur is a industrialize area most of the industry discharge their effluent into different rivers and beels. As Belai Beel was situated in this polluted are this water body are the most vulnerable to pollution (Mackenzie et al., 1995). Nematode parasites were most abundant in this study (50.64%) and cestode parasites were the lowest in this study.

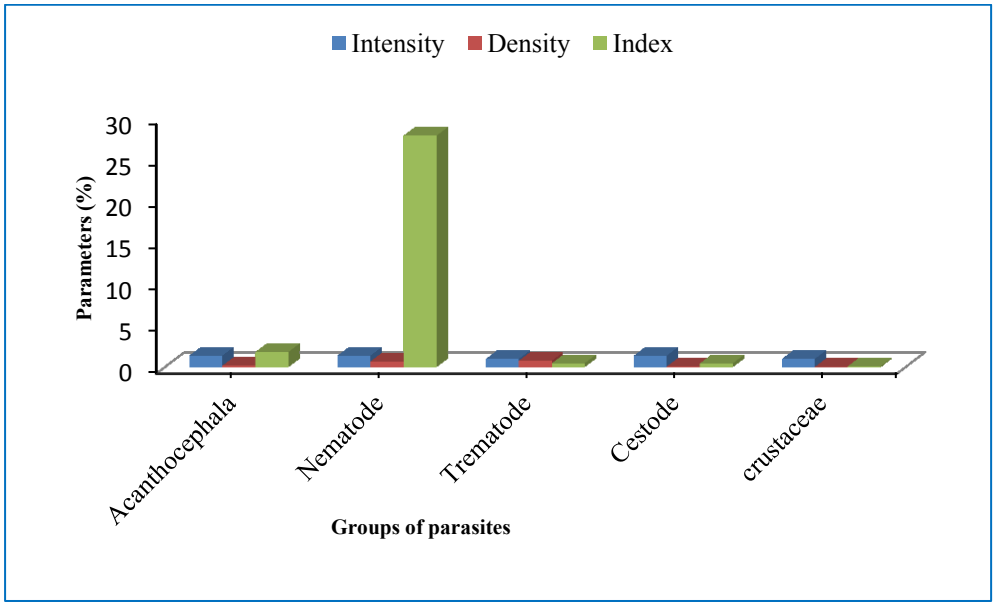

Figure 2: The fluctuations of overall incidence (%), intensity, density and index of parasites in Channa punctatus

It was observed that channa punctatus was infected by 26 species of parasites where five are protozoans (Trichodina sp., Chilodonella sp., Chilodonella sp. (cysts) and Ichthyobodo sp., Actinophrys sp.), eight platehelminthes (Dactylogyrus sp., Gyrodactylus sp., Metacercaria sp., Metacarcaria hemiuridae, Allocreadium sp., Apophalus sp., unidentified platehelminthes), seven nematodes (Procamallanus sp., larvae of Procamallanus sp., Camallanus sp. and round worm Pratylenchus sp., round worm , Rhabdochona sp., Ascaridia sp.), three acantoccephala (Pallisentis sp., Leptorhynchoides sp. and eggs of Acanthocephalan sp.), two arthopods (Larnaea sp., unidentified arthropod) one gastropod (Chaetonotus sp.) and one rotifer (Rotifer sp.) (Miah et al., 2013). In this study it was found that Channa punctatus was infected by 8 species where one nematode (Cammalanus sp.), one cestode (Senga sp.), two trematodes (Clinostomum sp., Eclinostomum sp.), two acanthocephalas (Pallisentis sp., Echinorynchus sp.) and two crustaceaes (Argulus sp., Larnaea sp.). This finding is lower than that of Miah et al., 2013.

A study was carried out in open water body of Sylhet region (Miah et al., 2013). From this study it is found that the incidence of protozoan parasitic infestation is high in open water body of Sylhet (60%) than Belai

Beel (5.76) of Gazipur but intensity of parasitic infestation of both nematode (75%) and acanthocephalan (19.23%) is high in Belai Beel than open water body of Sylhet (25% for nematode and 17.50% for acanthocephalan). On the other hand, intensity of infection of nematode is high in Belai Beel (1.67) than open water body of Sylhet(1.50) but infestation of protozoa and acanthocephalan is low in (1.00,1.00) in Belai Beel than open water body of Sylhet. In contrast, both the density and the index of parasitic infestation of acathocephala also high in Belai Beel (0.30, 3.07) than open water body of Sylhet (0.10, 0.33). Density of infection of nematode is also high Belai Beel (48.75) than open water body of Sylhet (3.75) (Table 3). These differences may be Gazipur an industrial area. Most of the industries discharge their pollutants into Belai Beel. This might be the reason of pollution which may be high in Belai Beel than open water body of Sylhet region.

Table 3: Comparison of study of parasitic infestation in Channa punctatus of Belai beel in dry season and open water body of Sylhet carried out by Miah et al., 2013 in dry season.

Parameters of infection	Protozoa		Nematode		Acanthocephala	
	Belai beel (Gazipur)	Open water body (Sylhet)	Belai beel (Gazipur)	Open water body (Sylhet)	Belai beel (Gazipur)	Open water body (Sylhet)
Incidence	5.76	60	75	25	19.23	17.50
Intensity	1.00	3.88	1.67	1.50	1.00	1.33
Density	0.05	2.33	0.25	0.38	0.30	0.10
Index	0.17	55.80	48.75	3.75	3.07	0.33

IV. CONCLUSION

The fresh water snake head *channa punctatus* were infected mostly by endoparasites. Four species of parasites were found all were endoparasites. Parasites are common in freshwater fishes because of all are inhabited in polluted environment at high stocking density. Most of the parasites are group of nematode although some acanthocephalans are also found from this study. The highest intensity of infection is found in the group of nematode and the lowest intensity of infection was found in the group of trematode and crustaceae. The highest density of infection was in the group of acanthocephalan and the lowest in the group of crustaceae. The highest Index of infection was in nematode and the lowest in the group of crustaceae. However, more in-depth research is needed to explore the parasitic infestation of *Channa punctatus*. Other parameters of water of Belai Beel should be studied.

V. REFERENCES

[1]. Afroz, T., Nabi, M.R., Mustafa, G. 1999. The morphohistology of alimentary canal of Chapila, Gudusia chapra. Bangladesh Journal of Zoology, 27: 51-55.

[2]. Chandra, K.J. 1998. The anatomy and histology of the alimentary tract of perch, Perca fluviatilis (L.). Progressive Agriculture, 9: 157-162.

[3]. Chandra, K.J. 2004. Fish Parasitology. Published by K Ray Choudhury, 34/A/2 Ram Babu Road, Mymensingh, Bangladesh, 179 pp.

[4]. Chandra, K.J., Islam, K.Z., 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.

[5]. Fent, K. 2007. Ökotoxikologie. Georg Thieme Verlag, Stuttgart.

[6]. Hecker, M. and Karbe, I. 2005. Parasitism in fish – an endocrine modulator of ecological relevance? Aquatic Toxicology, 72: 195-207.

[7]. Lafferty, K.D., Porter, J.W. and Ford, S.E. 2004. Are diseases increasing in the ocean? Annual Review of Ecology, Evolution and Systematics, 35: 31-54.

[8]. Mackenzie, K., Williams, H.H., Williams, B., Mcvicar, A.H. and Siddall, R. 1995. Parasites as indicators of water quality and the potential use of helminth transmission in marine pollution studies. Advances in Parasitology, 35: 85-144.

[9]. Margolis, L., Esch, G.W., Holmes, J.C., Kuris, A.M. and Schad, G.A. 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.

[10]. Miah, F., Deb, M., Ali, H., Quddus, M.M.A. and Ahmed, K. 2013. Comparative Surveillance of Parasitic Infestation in Channa punctatus (Osteichthys: Channidae) Collected from Open and Closed Water in Sylhet, Bangladesh.

[11]. Srivastava, S.J. and Singh, R. 1994. Seasonal changes in the testes of a freshwater murrel, Channa punctatus, Naturalia, 19: 119-130.

[12]. Sures, B., Knopf, K. and Kloas, W. 2001. Induction of stress by the swimbladder nematode Anguillicola crassus in European eels, Anguilla anguilla, after repeated experimental infection. Parasitology, 123: 179-184.

[13]. Wendelaar-Bonga, S.E. 1997. The stress response in fish. Physiol. Rev. 77: 591-625.