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Organal Distribution and their Seasonal rate of Infestation in *Glossogobius giuris*

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Abstract

This study aimed to estimate the parasitic infestation of an indigenous freshwater fish, Glossogobius giuris collected from different wetlands of Savar Upazila during November, 2013 to June, 2014. A total of 80 host fishes were examined during the study period of which 38 fishes were found infected by numerous helminth parasites. In all 58 parasites belonging to ten species were recorded from the surveyed hosts. Among them four were monogenetic trematodes, four were digenetic trematodes and two species were acanthocephalans. The prevalence, intensity and abundance of parasitic infection was a bit higher in female fish than in male. The highest level of infection was observed for host intestine, while lower levels were observed for host body cavity. In particular, the results also revealed that the prevalence, intensity and abundance of parasites of Glossogobius giuris varied with the season. Prevalence, intensity and abundance of the infestation were also found to be related to different length group of the hosts, the medium sized fishes (10.1-15.1) were more infested than the larger sized fishes (15.2-20.2) were less infested while the smaller sized fishes (5-10) showed medium infestation.

Keywords: *Glossogobius giuris,* helminth, parasite, prevalence, intensity and abundance.

Introduction

Fish has a remarkable impact on the lives of many individuals and communities in almost all continents of the world, primarily as a major source of relatively cheap and affordable essential animal protein. Fish interacts with the various levels of food chain and influence the structures of lakes, streams and estuaries since, they are usually restricted to particular modes of life related to their food sources and reproductive requirements[1]. Fish as the most feasible option in resolving protein shortage. Fish oil contains omega-3-essential fatty acids necessary for the proper functioning of the brain, heart, and immune system[2].

The role of freshwater fish in transmitting parasites to humans had been known for a long time. Fish parasites and diseases remain some of the most important problems confronting the fishery biologist[3]. Fish may serve as parentenic or definitive host of parasites that are harmful to man and animals. Zoonotic diseases that result from the ingestion of raw or under cooked fish include ophisthorchiasis, diphyllobothriasis, clonorchiasis, and anisakiasis[4].

Diseases of freshwater fishes in Bangladesh are a severe threat to water bodies. Many of them (15%-20%) are associated with parasitic infestation[5]. Parasites interfere with host nutrition, metabolism, and secretary functions of the alimentary canal, and can even damage the host nervous system[6]. Health of any population depends on the control of disease and maintenance of a healthy relationship between living creatures and their environment[7]. Intense parasite infection can also cause ulceration, and upset the normal course of reproduction[8,9].

A majority of freshwater fishes carry heavy infectious parasites which cause deterioration in the food value of fish and may even result in their mortality. Besides these are a number of helminthes parasites which are transmitted to human beings only through fish[10]. Fish diseases due to parasitic infestation, more specifically helminthes infestation is very important as it is known that they cause significant damage to their host. The helminthes parasites attack the host's stomach, body cavity, muscles, liver, kidney and air bladder and the damage done to these organs lead to death[11].

The intensity of fish parasitic infection is greatly influenced by seasonality, which affects host ecology and physiology[12]. Bashirullah[13], Ahmed[14], Parveen and Rahman[15] and recently Mofasshalin *et al.*[16] provide some preliminary information about the parasite fauna of freshwater fishes in Bangladesh.

Glossogobius giuris is one of the most popular freshwater fish in Bangladesh. It is considered to be one of the most important fish of Bangladesh because it is nutritious and delicious and it has high food value. It is commonly known as 'Bele' fish. Very little work has been done on the parasitic fauna of *Glossogobius giuris* in Bangladesh.

Studies on parasites of fishes in Bangladesh particularly in the wetland of Savar region of Bangladesh are very recent and fragmentary. Considering the above, the present study was aimed to survey the parasites of an in indigenous freshwater fish *Glossogobius giuris* in Savar region.

Material and Methods

Methods of sample collection: A total of 80 fishes were examined between November 2013 and June 2014, the fishes were purchased from fisherman, transferred into a plastic container with water and transported to the Fisheries Research Laboratory, Department of Zoology, University of Jahangirnagar for detailed investigation. Transportation was done in the morning to avoid undue stress due to temperature rise. Dead fishes were removed from the collections and examined immediately while the live ones were preserved in a plastic aquaria containing water from the reservoir, and examined subsequently as the investigation progresses. The fish was killed by cervical dislocation. The standard body length (from the tip of the snout to the end of the caudal peduncle) were measured and recorded for each fish specimen in centimeters with the aid of a measuring board. The weight for each fish was obtained by using a Meter balance. Sexes were determined, the male possess a distinct sexual papilla that is conspicuously located behind the anus, the sexual papillae are absent in females[17].

Examination of host fishes and collection of parasites: At first, the external surface of the host body including scales, fins, skin, fin base etc. were examined under a magnifying glass for ectoparasites or any kind of lesions. Then scrapping of the skin was done by an unshaped scalpel to collect the mucus in a Petridis for microscopic examination. Next, gills were removed from the bronchial cavity and placed on a glass slide for microscopic examination. To investigate the body cavity and general viscera, the body of the host fish was cut open and examined. The parietal peritoneal lining of the body cavity, outer surface of the visceral organs and serous membranes were examined for encysted larva. The entire viscera was then removed from the body cavity and kept in physiological saline solution (0.75% NaCl solution). Considerable attention was given to the internal organs, viz., heart, air bladder, liver, gall bladder, spleen, urinary bladder, gonads and kidneys. After examination of the external surface, the organs were dissected to search out the internal parasites. Peritoneum and mesenteries were also observed for parasites. A drop of the residue was placed on the slide, and observed under ×10 and ×40 objectives of the light microscope for the various parasites; this was repeated until the entire residue has been examined.

Recovery of parasites: Most of the parasites were easily identified by their wriggling movements, parasites found were counted, labeled with the serial number of the fish and placed in physiological saline overnight to allow them stretch and relax. Cestodes, Nematodes and Acanthocephalan parasites recovered were stained using the procedure of Khalil[18]. Identification of specimen to species level were undertaken and confirmed with the assistance of Oniye *et al.*[19], who had earlier confirmed the identity of the parasites through the assistance of the British Museum (Natural history), United Kingdom. The terms prevalence, intensity and abundance were applied as defined by Margolis *et al.*[20], while range refers to zero to maximum number of parasites retrieved from a fish host.

Results and Discussion

In figure-1, out of 80 specimens of *Glossogobius giuris,* the Prevalence of the worm was more in female fish than in male fish (figure-1). Of the total fishes examined 26 out of 47 females (55.32%) were found infected in comparison to 12 out of 33 (36.36%) males. The intensity of infestation was 1.61 in female fishes than in male fishes it was 1.33. The abundance of parasites was .89 in female fish than in male it was .48. In the present study, it was revealed that prevalence, intensity and abundance were highest in female fishes than in male (figure 1). Similar reports were also observed by Thomas[21], Khanum and Parveen[22] and Rahman and Saidin[23]. They concluded that this may be due to lower physiological resistance of female fishes. According to Dobson[24] female fishes were more susceptible to parasite infection during breeding season.

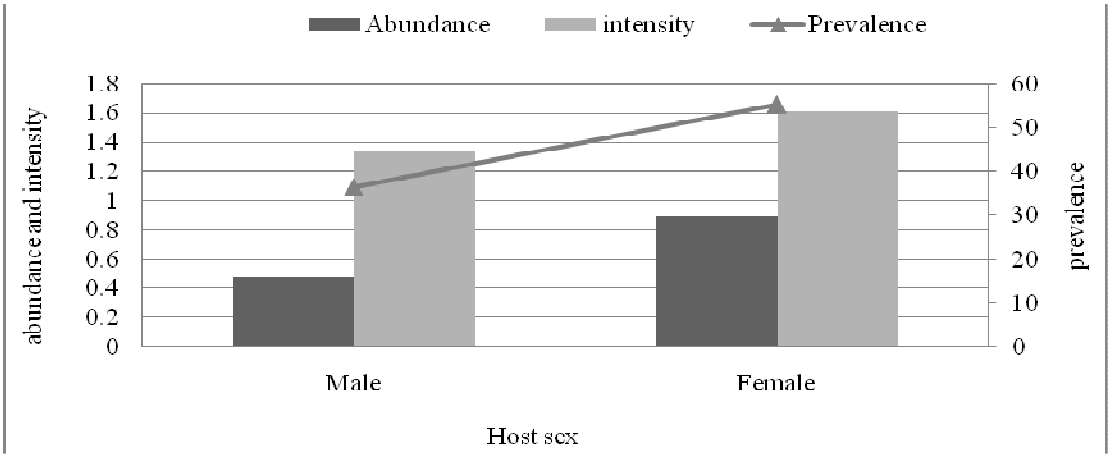

Figure-1
Variation in the Prevalence, intensity and abundance of helminth parasites in male and female fishes of *G. giuris*

Throughout the study period, a total of 80 specimens of *G. giuris* were examined, leading to the identification of ten different parasite species (Four monogenetic trematodes, four digenetic trematodes and two acanthocephalans). In table 1 the endoparasites were found mainly in the intestine and gills of the host fish. Four species of monogenetic trematode, *Dactylogyrus cirrhini*, *Dactylogyrus glossogobii*, *Glossodactylogyrus bangladeshi* (Saha, Chandra and Ghosh, 2003), *Neodactylogyrus chandrai* (Saha, Chandra and Ghosh, 2003) were collected from the gills (table-1). The two digenetic trematodes *Allocreadium* sp. *and Genarchopsis* sp. were identified only to genus level because of their complex taxonomic features and they were collected from intestine. Another two digenetic trematodes, one collected from intestine and stomach was *Allocreadium glossogobium* and another collected from intestine was *Allocredium handiai*. The two acanthocephalans *Pallisentis nandai* was found in the intestine and *Pallisenties goboes* was found in the intestine and body cavity. Bashirullah[25] first time reported that *Pallisentis nandai* from *N. nandus.* Rahman and Ali[26] described *Pallisentis nandai* from the stomach and intestine of *Nandus nandus. Pallisentis gaboes* was found in the *Channa striata, Clarius batrachus* which was recorded by Ahmed and Begum[27] and in my present study I found this parasitic fauna from *G. giuris*. *Allocreadium handiai* was found in *Channa punctatus, Mystus cavasius* which was recorded by Banerjee and Chandra[28]. But it was found in *Glossogobius giuris* from my study.

Table-1
Organ-wise distribution of parasites observed in *Glossogobius giuris* (n=80)

Type of Parasites	Name of Parasites	Infected organ
Trematode (Monogenetic)	*Dactylogyrus cirrhini*	Gill
	Dactylogyrus glossogobi	Gill
	Glossodactylogyrus bangladeshi	Gill
	Neodactylogyrus chandrai	Gill
Trematode (digenetic)	*Allocreadium glossogobium*	Stomach, intestine
	Allocredium handiai	Intestine
	Allocredium sp.	Intestine
	Genarchopsis dasus	Stomach, intestine.
Acanthocephala	*Pallisentis nandai*	Intestine
	Pallisentis gaboes	Body cavity, intestine

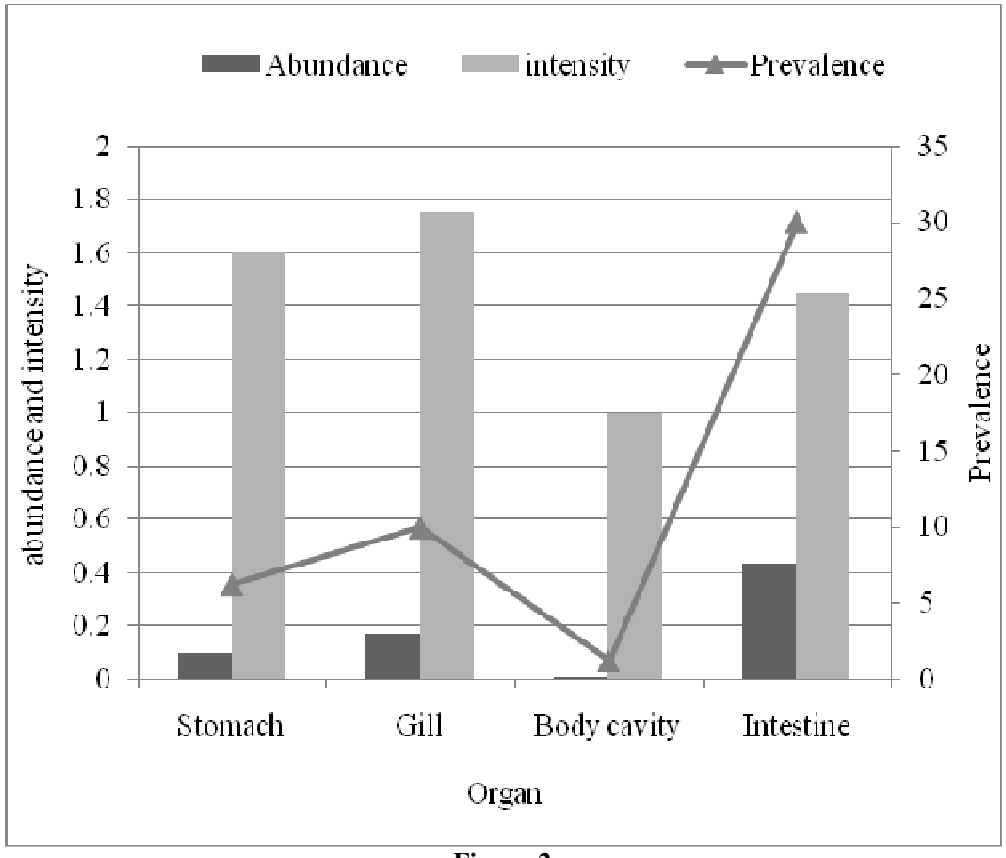

Figure-2
Variation in the prevalence, intensity and abundance of parasites in different organs of *G. giuris*

Organ-wise fluctuation in the prevalence, abundance and intensity of total parasites is reported in figure-2. Intestinal parasites had the highest prevalence (30%) and abundance (.44), while parasite of body cavity had the lowest prevalence (1.25%) and abundance (.01). Gill parasites had high prevalence too (10%) and abundance (.175). Khanum *et al.*[29], also observed the maximum helminth infestation from intestine. Present findings are in conformity with Khatun[30] who concluded that host intestine is the most preferred site for helminth infestation. Sarma[31] also found the similar results during his study in three murrel host species. Rahman and Parween[32] and Alam *et al*., [33] also observed similar parasitic infestations in different freshwater fish species in Bangladesh.

Seasonal fluctuations in the overall prevalence, abundance and intensity of total parasites are shown in figure 3. The highest parasitic prevalence (16.25%) was observed in December, while the lowest was observed both in April and May (1.25%). Secondary peaks of prevalence (13.75%) were observed in January. The overall highest mean abundance value was .312 (recorded in December), while the lowest was .01 (recorded in April-June). A second peak of .187 was recorded in January. The highest parasitic intensity (1.92) was observed in December, while the lowest (1.0) was observed in (March to May). The intensity of parasites in different organs of *Glossogobius giuris* varied with the season, being higher during winter(November-February). Winter had already been identified as a period of high susceptibility of fish to parasites[34-36].

Fluctuation of prevalence, intensity and abundance of parasites in different length group of *G. giuris* are shown in figure 4. The highest prevalence of parasite (62.85%) was recorded from 35 fish samples belonging to the medium length group (10.1-15.1cm) and the lowest (32%) from 25 fish samples belonging to the smaller length group (5-10cm). The prevalence of parasites in the larger length group (15.2-20.2cm) was 40% (figure-4). The highest intensity of parasites (1.75) was observed in the larger length group and the lowest (1.45) in the medium length group while that of the smaller length group was 1.5, which is closed to the lower value. The abundance value ranged from .48 to .7, the highest value was recorded from the larger length group while the lowest from the smaller length group (figure-4). It was observed that among the different size groups of fishes, the maximum infestation were recorded from the medium length group than the smaller and larger length group of fishes. The rate of infestation was more smaller length group than larger, but prevalence of infestation in the medium group was more than smaller group. The present finding agrees with those of Golder *et al*., [37].

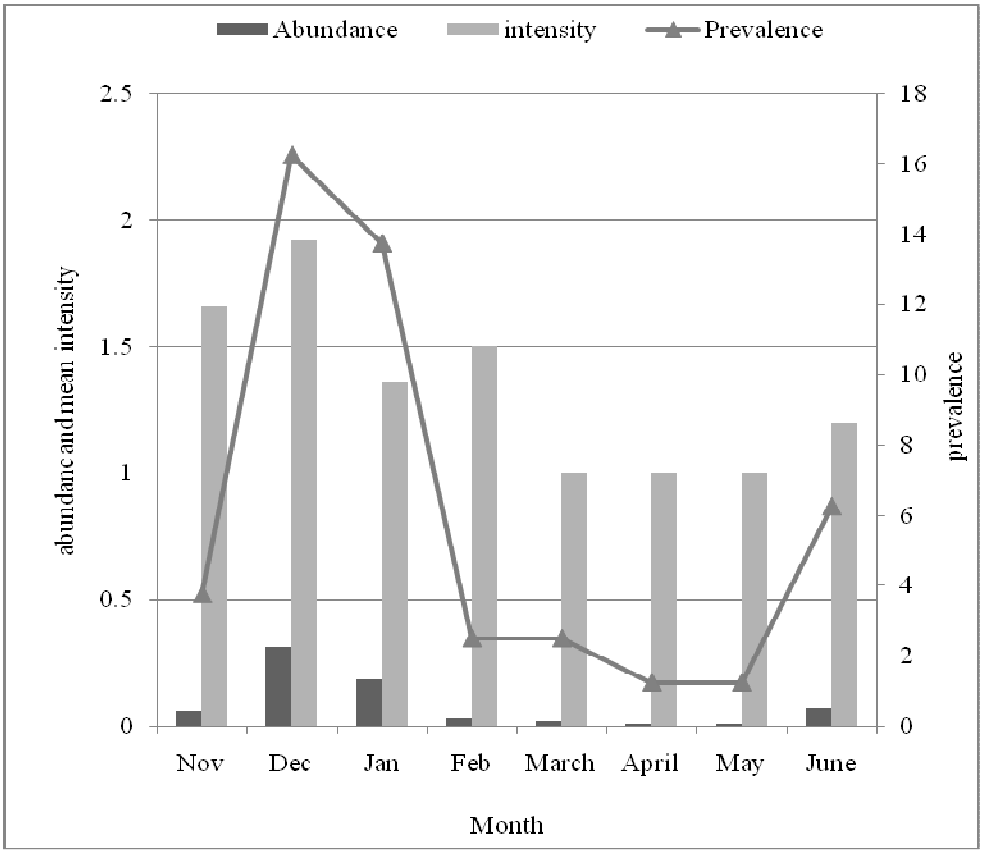

Figure-3
Seasonal fluctuation in the prevalence, intensity and abundance of parasites in *G. giuris*

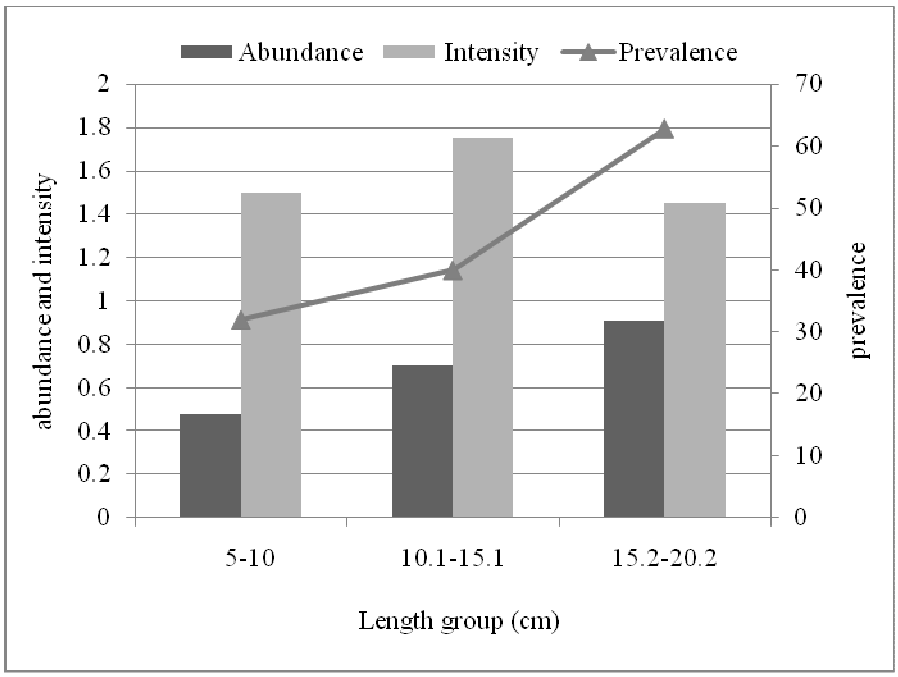

Figure-4
Length-wise variation in the prevalence, intensity and abundance of parasites in *G. giuris*

Conclusion

The present study describes the prevalence, abundance and intensity of parasitic infestation in different length of *Glossogobius giuris.* During the study period we identified ten parasite species. The highest peak of parasite abundance and prevalence was recorded in December, while the lowest were recorded in April and May. This might be due to their feeding preference, stocking density, water depth and temperature along with other physico-chemical parameters and management practices. However, more in-depth research is needed to explore the parasitic infestation of *G.giuris.* The authors hope that this study will promote further parasitological research on *G, giuris* and other common freshwater fish in Bangladesh.

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