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***Communication:***

# Intensity of parasitic infestation in silver carp, *Hypophthalmichthys molitrix**

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**Silver carp, *Hypopthalmichthys molitrix* is one of the most economically valuable fish species in Bangladesh. However, its production is often hindered by parasite-induced mortality. The present study reports the intensity of parasitic infestation in 216 specimens of *H. molitrix* collected from different fish markets in Rajshahi City, Bangladesh. Nine different parasite species (*Trichodina pediculatus*, *Dactylogyrus vastator*, *Ichthyophthirius multifilis*, *Gyrodactylus elegans*, *Lernaea* sp., *Apiosoma* sp., *Myxobolus rohitae*, *Camallanus ophiocephali*, and *Pallisentis ophiocephali*) were recovered from the gill, skin, stomach, and intestine of host fish. The highest level of infection was observed for host skin, while lower levels were observed for host gill, stomach, and intestine. The results also revealed that the intensity of parasite infection in different organs of *H. molitrix* varied with the season. In particular, the highest levels of infection were recorded during the winter period (November–February), when fish are most susceptible to parasites. The findings of the study will help in the management and conservation of *H. molitrix*.**

**Key words:** Freshwater fish, Disease, Parasites, Carp fishery, Infestation, Aquaculture, Bangladesh

## 1 Introduction

Diseases of freshwater fishes in Bangladesh are a severe threat to aquaculture. Many of them (15%–20%) are associated with parasite infestation (Chowdhury, 1998).

Parasites interfere with host nutrition, metabolism, and secretory functions of the alimentary canal, and can even damage the host nervous system (Markov, 1961). Intense parasite infection can also cause ulceration, and upset the normal course of reproduction (Rahman and Jahan, 2002; 2005). All these effects may induce host mortality. Piscivorous animals may become infected consequent to the consumption of parasitized fish (Faust, 1939).

The intensity of fish parasitic infection is greatly influenced by seasonality, which affects host ecology and physiology (Pennycuick, 1971; Rahman *et al*., 2007). Bashirullah (1973), Ahmed and Sanaullah (1977), Ahmed (1981), Zaman *et al*. (1986), Hossain *et al*. (1994a; 1994b), Hafizuddin and Shahabuddin (1996), Akhter *et al*. (1997), Rahman *et al*. (1998), Parween and Rahman (2000), Banu and Khan (2004), Ahmed *et al*. (2009), and recently Mofasshalin *et al*. (2012) provide some preliminary information about the parasitofauna of freshwater fishes in Bangladesh.

Marine fisheries dominate total fish production in Bangladesh; nevertheless, freshwater aquaculture has grown rapidly, and contributes an increasing share of fish available for consumption. Fish from aquaculture trebled in the period from 1989 to 1999. About 85% of fish produced in ponds are carp (DOF, 2011), and include exotic carp species such as silver carp (*Hypopthalmichthys molitrix*) (Valenciennes, 1844) and common carp (*Cyprinus carpio*) (Linnaeus

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1758), and indigenous carp species.

Among the farmed carp species, silver carp is very popular in Bangladesh especially in northwest areas of the country. Although several studies have been conducted on freshwater carp in Bangladesh, none of them focused on the intensity of parasitic infestation in silver carp in Bangladesh. In the present study we determine the intensity of infestation and organ-wide distribution of parasites of *H. molitrix*.

## 2 Materials and methods

Specimens of silver carp were collected every week at regular intervals from different fish markets in Rajshahi City, Bangladesh (Fig. 1) over a period of six months from September 2009 to February 2010. All the silver carp available from those markets were landed from the adjacent ponds, beels, and other water bodies. The specimens were kept in a refrigerator soon after collection and examined generally within three to five days.

The host specimens were first examined using a magnifying glass to find ectoparasites on the skin and gills (Mofasshalin *et al.*, 2012). To collect the endoparasites, individual fish were dissected by an incision through the mid ventral longitudinal line. The viscera were removed and put into physiological saline solution (0.7% (7 g/L) NaCl). Then the stomach, intestine, and liver were examined separately for endoparasites. The stomach and intestine were split open and were shaken in a tube to dislodge any parasites attached to the epithelial lining. Sometimes the epithelial layers of the stomach and intestine were scraped with a scalpel to remove the parasites.

The parasites found were carefully removed and preserved in individual vials in 70% alcohol with few drops of glycerine for 24 h. Protozoan parasites were


**Fig. 1 Sampling site Rajshahi City, Bangladesh**
The black box denotes the study area

examined at high magnification under a binocular microscope and the other parasites were washed with fresh saline solution, then fixed in alcohol-formalin-acetic acid (AFA) solution and heated with a spirit lamp to 70–75 °C. The parasites were again washed with 70% alcohol, temporarily mounted in Canada balsam on slides, and finally examined under a compound microscope (BX51, Olympus, Japan) and identified according to Chandra (2004). The prevalence, abundance, and mean density of parasites were estimated according to Margolis *et al*. (1982).

## 3 Results and discussion

Throughout the study period, a total of 216 specimens of silver carp were examined, leading to the identification of nine different parasite species (seven ectoparasites and two endoparasites). The ectoparasites were found mainly in the skin (the whole body surface of the hosts as well as the fins) and gills of the host fish. Three species of ectoparasites, *Trichodina pediculatus* (Muller, 1786), *Dactylogyrus vastator* (Nybelim, 1924), and *Ichthyophthirius multifilis* (Fouquet, 1876) were collected from the gills (Table 1). The other four ectoparasites, collected from the skin, were *Gyrodactylus elegans* (von Nordmann, 1832), *Lernaea* sp. (Linnaeus, 1785), *Apiosoma* sp. (Blanchard, 1885), and *Myxobolus rohitae* (Butschli, 1882). The ectoparasites *Lernaea* and *Apiosoma* were identified only to genus level because of their complex taxonomic features. The endoparasites *Camallanus ophiocephali* (Pearse, 1955) and *Pallisentis ophiocephali* (Datta, 1936) were found in the stomach and intestine respectively of the hosts during the study period (Table 1). Forhaduzzaman *et al*. (2010) reported most of these parasites in *Labeo rohita* (Hamilton, 1822) from Rajshahi, Bangladesh. Mofassalin *et al*. (2012) also reported similar parasites in three Indian minor carp (*L. bata*, *L. gonius*, and *C. reba*) from the freshwater bodies of Rajshahi, Bangladesh.

Organ-wise fluctuation in the prevalence, abundance and mean density of total parasites is reported in Fig. 2. Skin parasites had the highest prevalence (51.38%), while stomach parasites had the lowest (10.77%). Gill parasites had high prevalence too (43.05%). The highest parasite abundance was found in the skin (with an average of 1.25), while the lowest was found in the intestine (0.30). By contrast, the mean density value was highest in the stomach (4.00), and lowest in the gills (2.06) and in the skin (2.43). These observations on parasitic infestation are consistent with those of Forhaduzzaman *et al*. (2010) and Mofasshalin *et al*. (2012) in carp fishes of Bangladesh. Rahman and Parween (2001), Alam *et al*. (2006), and Rahman *et al*. (2007) observed similar parasitic infestation in different freshwater fish species of Bangladesh.

Monthly fluctuations in the overall prevalence, abundance, and mean density of total parasites are shown in the Fig. 3. The highest parasite prevalence (75.0%) was observed in December, while the lowest (41.6%) was observed in October. Secondary peaks of prevalence (66.6%) were observed in November and January. The overall highest mean abundance value was 3.83 (recorded in December), while the lowest was 1.25 (recorded in September). A second

**Table 1 Organ-wise distribution of parasites observed in *H. molitrix* (*n*=216)**

| Type of parasites | Name of parasites | Infected organ |
|---|---|---|
| Ectoparasites | *Trichodina pediculatus* | Gill |
| | *Dactylogyrus vastator* | Gill |
| | *Ichthyophthirius multifilis* | Gill |
| | *Gyrodactylus elegans* | Skin |
| | *Lernaea* sp. | Skin |
| | *Apiosoma* sp. | Skin |
| | *Myxobolus rohitae* | Skin |
| Endoparasites | *Camallanus ophiocephali* | Stomach |
| | *Pallisentis ophiocephali* | Intestine |

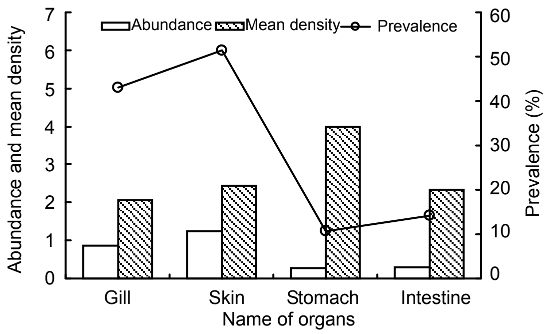


**Fig. 2 Variation in the prevalence, abundance, and mean density of parasites in different organs of *H. molitrix***

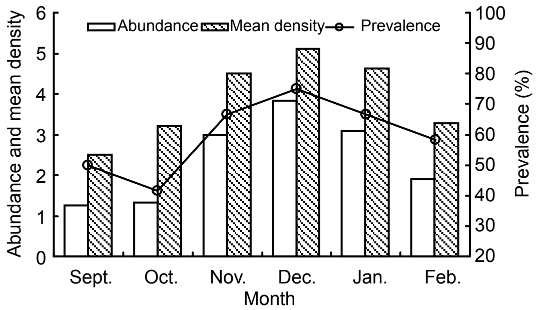


**Fig. 3 Monthly fluctuations in prevalence, abundance, and mean density of parasites in *H. molitrix***

peak of 3.08 was recorded in January. The highest mean parasite density (5.11) was observed in December, while the lowest (2.50) was observed in September. The intensity of parasites in different organs of *H. molitrix* 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 (Rahman *et al.*, 2007; Forhaduzzaman *et al.*, 2010; Mofasshalin *et al.*, 2012).

## 4 Conclusions

The present study describes the intensity of parasitic infestation in different organs of silver carp *H. molitrix*. During the study period we identified nine parasite species. The highest peak of parasite abundance and prevalence was recorded in December, while the lowest was recorded in September. 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 silver carp. The authors hope that this study will promote further parasitological research on *H. molitrix* and other commercially important carp in Bangladesh.

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