

COPEPOD ECTOPARASITES OF *HYPOPHTHALMICHTHYS MOLITRIX* FROM FISH HATCHERY PIROWAL (KHANEWAL, PUNJAB)

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ABSTRACT

From February 1999 to January 2000, 120 silver carps (*Hypophthalmichthys molitrix*) were collected at Pirowal Fish Hatchery Khanewal (Punjab, Pakistan) and were examined for copepod ectoparasites. Out of 120, only 12 specimens (10%) of silver carps were infested. Six species of *Lernaea* (L.) recorded were *L. cyprinacea* Linnaeus, 1761; *L. polymorpha* Yu, 1938; *L. oryzophila* Monod, 1932; *L. lophiara* Harding, 1950 and *L. ctenopharyngodonis* and *L. arcuata* Soejanto, 1965. The overall prevalence was highest for *L. cyprinacea* (9.16%) followed by *L. polymorpha* (6.66%) *L. lophiara* (3.33%), *L. oryzophila* (2.5%) *L. ctenopharyngodonis* (2.5%) and *L. arcuata* (1.6%). *L. polymorpha* and *L. cyprinacea* were the most abundant species than the other ectoparasites in multiple infestation. Parasites were not found in the smallest and the largest fishes and number of parasites decreased as the weight of the fish increased.

Key words: Silver carp, fish, *Lernaea* spp., copepod ectoparasites.

INTRODUCTION

Losses due to fish mortality as a result of parasitism from the smallest collective farm ponds to the largest lakes and rivers, are extremely high. In addition to this a great deal of loss is incurred, but not taken into account in analyzing the economic aspects of the fisheries. As a result of the inferior quality of the fishery products obtained due to the pathogenic influences exerted on fish by the parasites living on and in their bodies, nourishing themselves at the expense of their hosts, and poisoning the fish with their metabolic products.

These facts clearly indicate the importance of true assessments of the parasitological factors in planning rational fishery management in order to improve the productivity of the national fishery economy. Extensive research has been carried out on parasites of marine and freshwater fish in Pakistan, but there are few published reports on parasitic fauna of cultured fish (Tasawar *et al.*, 1999a; Tasawar and Khurshid, 1999; Tasawar and Naseem, 1999; Tasawar *et al.*, 1999b). The learnaeid parasites of silver carp have not been studied in Pakistan. Therefore, the results of the present investigation are expected to be helpful for further research programs on fish parasites. The objectives were to study the copepod ectoparasites of *Hypophthalmichthys (H) molitrix*, their overall prevalence, determine the relationship between body length, body weight and copepod parasites of *H. molitrix*.

MATERIALS AND METHODS

Hypophthalmichthys molitrix (10 months) were collected from February 1999 to January 2000 at Pirowal Fish Hatchery Khanewal, (Punjab, Pakistan). Fishes caught by drag net, were kept alive in a circular water tank, and examined for the presence of ectoparasites. The parasites were removed with the help of fine forceps and preserved in 5% or 10% formalin. Fishes were measured, weighed and then released back into the pond water. Identification of the fishes was accomplished with help of keys given by Mirza and Sharif (1996). The collected ectoparasites were then brought to the B.Z. University Parasitology Research Laboratory for further examination. The permanent mounts were made (Cable, 1985) and examined under the microscope.

RESULTS AND DISCUSSION

Prevalence of copepod ectoparasites of *H. molitrix*.

The present investigation was carried out to study the occurrence of *Lernaea* spp from *H. molitrix* (silver carp). For this purpose 120 specimens of *H. molitrix* were examined from Fish Hatchery Pirowal, (Punjab, Pakistan). Six species of the genus *Lernaea* identified during the present study were *L. cyprinacea* Linnaeus, 1761; *L. polymorpha* Yu, 1938; *L. oryzophila* Monod, 1932; *L.*

lophiara Harding, 1950; *L. ctenopharyngodonis* and *L. arcuata* Soejanto, 1965.

Lernae spp. are widely distributed parasites and have been recorded from different parts of the world. Marcogliese (1991) examined *L. cyprinacea* on three species of fish from the Belews lake, North Carolina, while Berry *et al.* (1991) reported *L. cyprinacea* from East Canyon Reservoir, Utah (USA). *L. cyprinacea* and *L. polymorpha* were reported by Kularatne *et al.* (1994). Boxshall *et al.* (1997) observed a new *Lernaea* species *L. devastatrix* from Brazil.

Different species of *Lernaea* have also been reported from Pakistan. *L. polymorpha*, *L. cyprinacea*, *L. arcuata*, *L. lophiara* and *L. oryzophila* from *Labeo rohita* reported by Tasawar *et al.* 1999a. On *L. rohita* four species of *Lernaea* were reported by (Arshad, 1999). These were *L. cyprinacea*, *L. polymorpha*, *L. oryzophila* and *L. lophiara*, while same species have been reported by Nazli, (1999) and Razaq, (1999) on hybrid and *Catla catla*.

The differences have been observed in the parasite fauna of the present study with Marcogliese (1991), Berry *et al.* (1991), Kularatne *et al.* (1994) and Boxshall *et al.* (1997). These differences may be due to different hosts examined, parasite host specificity and geoclimatic conditions. The absence of *L. arcuata* in studies conducted by Arshad, (1999), Nazli, (1999) and Razaq, (1999) is difficult to explain, because Tasawar *et al.* (1999a) have also recorded this species. The only possible explanation could be that infested fish were not included in the catch.

The prevalence of copepod ectoparasites of *H. molitrix* was studied and the results are shown in Table 1 and it was found that only twelve (10%) out of one hundred and twenty specimens of silver carp were infested. *L. cyprinacea* was found to be maximum (9.16%) followed by *L. polymorpha* (6.66%) *L. oryzophila*, *L. lophiara*, *L. ctenopharyngodonis* and *L. arcuata* as 2.5, 3.33, 2.5 and 1.6%, respectively.

Table 1: The overall prevalence of copepod ectoparasites of *H. molitrix* from fish hatchery pirowal (Khanewal, Punjab) (n=120).

Name of Parasite	No. of fish infested	Prevalence (%)
<i>Lernaea cyprinacea</i>	11	9.16
<i>L. polymorpha</i>	8	6.66
<i>L. oryzophila</i>	3	2.5
<i>L. lophiara</i>	4	3.33
<i>L. ctenopharyngodonis</i>	3	2.5
<i>L. arcuata</i>	2	1.6

The prevalence of *Lernaea* spp has been reported previously on *Ctenopharyngodon idella* and *L. polymorpha* was found to be maximum (38.33%)

followed by *L. cyprinacea* (9.16%). *L. ctenopharyngodonis* and *L. lophiara* 4.16% and 3.33%, respectively (Tasawar *et al.*, 1999b). *L. polymorpha* was the predominant species on *L. rohita* which had prevalence (5.83%) followed by *L. cyprinacea* (5%), *L. oryzophila* (1.66%) and *L. lophiara* (1.66%) (Arshad, 1999), on hybrid prevalence of *L. cyprinacea* was maximum (21.66%) followed by *L. polymorpha*, *L. lophiara* and *L. oryzophila* (15.83, 4.16 and 2.5%), respectively (Nazli, 1999). On *C. catla* *L. cyprinacea* was the predominant species which had (26.67%) followed by *L. polymorpha* (25.83%), *L. oryzophila* (4.17) and *L. lophiara* (2.5%) (Razaq, 1999).

The lower prevalence of *Lernaea* spp recorded during the present study as compared to higher prevalence reported by Tasawar *et al.*, 1999b could be due to chemical control measures taken at Pirowal Fish Hatchery. While the differences observed in the present study with studies conducted by (Arshad, 1999; Nazli, 1999; Razaq, 1999) could be due to host resistance to these parasites (*L. rohita* seems to be more resistant fish) and distribution of host in pond. *H. molitrix* is pelagophilic, while hybrid and *Catla catla* are column feeder and are more exposed to the developmental stages of parasites which are found at or near the bottom where temperature is relatively low.

The mixed infestation of copepod, ectoparasites of *H. molitrix*.

The multiple infestation of copepod, ectoparasites of *H. molitrix* was studied (Table 2) and it was found that only three out of one hundred and twenty specimens were infested with *L. cyprinacea*, one with *L. arcuata*, four fishes were infested with *L. cyprinacea*, *L. polymorpha* and *L. lophiara* only two specimens had infestation of *L. cyprinacea*, *L. polymorpha*, *L. oryzophila*, *L. lophiara* and *L. ctenopharyngodonis*. Only one fish had a combination of *L. cyprinacea*, *L. polymorpha*, *L. lophiara*, *L. oryzophila*, *L. arcuata* and *L. ctenopharyngodonis*.

Table 2: Mixed infestation of copepod ectoparasites of *H. molitrix* from hatchery Pirowal (Khanewal, Punjab) (n=120).

Species combination	No. of fish infested
<i>Lernaea cyprinacea</i>	3
<i>L. arcuata</i>	1
<i>L. cyprinacea</i> + <i>L. polymorpha</i>	4
<i>L. cyprinacea</i> + <i>L. polymorpha</i> + <i>L. lophiara</i>	1
<i>L. cyprinacea</i> + <i>L. polymorpha</i> + <i>L. lophiara</i> + <i>L. oryzophila</i> + <i>L. ctenopharyngodonis</i>	2
<i>L. cyprinacea</i> + <i>L. polymorpha</i> + <i>L. lophiara</i> + <i>L. oryzophila</i> + <i>L. arcuata</i> + <i>L. ctenopharyngodonis</i>	1

Interspecific competition in host populations can have a great influence on the population dynamics of

parasites (Cone and Roth, 1993). This perspective can be applied to the present study as *L. polymorpha* and *L. cyprinacea* seem to be the dominant species as compared to *L. oryzophila*, *L. arcuata* and *L. lophiara*.

Relationship between body length and weight and copepod ectoparasites

Relationship between body length and copepod ectoparasites of *H. molitrix* was studied (Table 3) and minimum prevalence was observed in smallest and largest fishes. Parasitic infestation reached to maximum in the length groups (36.3-41.9 cm followed by 24.9-30.5, 30.6-36.2, 42.48 and 19.2-24.8 cm) which had (148, 27.23 and 5) parasites respectively. *L. cyprinacea*, *L. ctenopharyngodonis* and *L. arcuata* reached to peak in the (36.3-41.9 cm) length group. *L. oryzophila* was maximum in (24.9-30.5 cm) length group, while *L. lophiara* was in (30.6-36.2 cm). Except *L. cyprinacea* other parasitized were absent in the (19.2-24.8 cm) length group except *L. cyprinacea* and *L. polymorpha* other parasites were absent in (42-48 cm) length group. It was observed that as the length of the host increased infestation decreased. It may be due to the development of acquired immunity in larger fish as reported by Tasawar *et al.* 1999(a), Tasawar and Khurshid (1999), Tasawar and Naseem (1999), Arshad

(1999), Nazli (1999) and Razaq (1999). While the structure of scales of small fish could be responsible for the absence of parasites in this group.

Relationship between body weight and copepod ectoparasites of *H. molitrix* was studied (Table 4) and minimum infestation was found in the large body weight fishes. Parasites infestation reached to maximum in the weight group (326.8-612.3 g followed by 40-325.8, 613.63-899.4 and 900.4-1186.2 g) which had (147, 32, 24 and 8) parasites respectively. Except *L. cyprinacea* and *L. polymorpha* other parasites were absent in the (900.4-1186.2 g) weight group. Parasites were not found in the weight groups (1187.2-1412 and 1473-1755 g) *L. cyprinacea*, *L. polymorpha* and *L. lophiara* reached to peak in the weight group (326.8-612.3 g), while *L. oryzophila* was maximum in the weight group (40-325.8 g). *L. ctenopharyngodonis* and *L. arcuata* were in (613.63-899.4 g) weight groups.

It was observed that as the weight of the host increased, parasitic infestation decreased. It may be due to the acquired immunity of fish as reported by, Tasawar *et al.* (1999a), Tasawar and Khurshid (1999), Tasawar and Naseem (1999), Arshad (1999), Nazli (1999) and Razaq (1999).

Table 3: Relationship between body length and copepod ectoparasites of *H. molitrix* from fish hatchery Pirowal (Khanewal, Punjab).

Species Name	Body length of fish (cm)					
	13.5 – 19.1	19.2 – 24.8	24.9 – 30.5	30.6 – 36.2	36.2 – 41.9	42 – 48
<i>Lernaea cyprinacea</i>	-	5	10	7	80	5
<i>L. polymorpha</i>	-	-	3	12	53	3
<i>L. oryzophila</i>	-	-	10	1	5	-
<i>L. lophiara</i>	-	-	1	2	1	-
<i>L. ctenopharyngodonis</i>	-	-	2	1	6	-
<i>L. arcuata</i>	-	-	1	-	3	-

Table 4: Relationship between body weight and copepod ectoparasites of *H. molitrix* from fish hatchery Pirowal (Khanewal, Punjab).

Species Name	Body weight of fish (gm)					
	40-325.8	326.8-612.3	613.63-899.4	900.4-1186.2	1187.2-1412	1413-1755
<i>Lernaea cyprinacea</i>	15	84	3	5	-	-
<i>L. polymorpha</i>	3	59	6	3	-	-
<i>L. oryzophila</i>	10	1	5	-	-	-
<i>L. lophiara</i>	1	2	1	-	-	-
<i>L. ctenopharyngodonis</i>	2	1	6	-	-	-
<i>L. arcuata</i>	1	-	3	-	-	-

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