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INVESTIGATIONS OF LERNAEID PARASITES OF *CATLA CATLA*

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Abstract: *Lernaea* spp., belonging to the family Lernaeidae were studied from *Catla catla* from February 1999 to January 2000 at Government Fish Hatchery Pirowal (Punjab, Pakistan). Four species of lernaeid found were *Lernaea cyprinacea* Linnaeus, *L. polymorpha* Ya, *L. oryzophila* Monod and *L. lophiara* Harding. *Lernaea cyprinacea* had maximum overall prevalence (26.67%) followed by *L. polymorpha* (25.83%), *L. oryzophila* (4.17%) and *L. lophiara* (2.50%). The results of mixed infestation showed that *L. cyprinacea* was the most abundant parasite. Maximum infestation in *C. catla* for *L. cyprinacea* (36), *L. polymorpha* (34), *L. oryzophila* (3) and *L. lophiara* (1) was recorded in 214-413 g weight groups while minimum in highest weight groups. The infestation was lowest in minimum and maximum length ranges of host.

Key words: *Lernaea* spp., *Catla catla*, overall prevalence, mixed infestation, body weight, body length.

INTRODUCTION

Lernaea spp., belong to the family Lernaeidae and are parasitic on freshwater fishes (Hoffman, 1976). Adult females attach to the exposed body surfaces of host fishes, where they cause acute hemorrhage and ulcers at the site of penetration. Fatality occurs as a result of blood loss and secondary infections (Putz and Bowen, 1964). The lernaeid can develop from mature eggs to the first copepodid or parasitic larval stage in as little as 4 to 8 days (Al-Hamed and Hermiz, 1973). Only females are found to parasitize. The parasite can be found on various parts of the host's body surface, and appear as small worm-like protrusions. *Lernaea* spp., seem to show no preference for a particular body area for attachment, however, the most heavily infested locations are found behind the pectoral fins, in the buccal cavity and/or the base of the caudal fin (Al-Hamed and Hermiz, 1973). Infestations in crowded breeding ponds causes serious economic problems (Al-Hamed and Hermiz, 1973).

Investigations into parasites of marine and freshwater fish have been carried out in Pakistan but there are few published reports on parasitic fauna of cultured fish (Tasawar and Hussain, 1999; Tasawar and Khurshid, 1999; Tasawar and Naseem, 1999; Tasawar *et al.*, 1999). The present study was, therefore, designed to investigate the learnaeid parasites of *C. catla*, study their overall prevalence, study the mixed infestation of these parasites, determine the relationship between weight and body length and lernaeid

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parasites of *C. catla*.

MATERIALS AND METHODS

Fishes for the present study (*Catla catla*) were collected from Pirowal Fish Hatchery, Khanewal (Punjab, Pakistan) during the period from February 1999 to January 2000. Monthly samples (10 fishes/month) were collected with the help of drag net and alive fishes were examined for the presence of ectoparasites i.e., *Lernaea*. Ectoparasites were removed with the help of fine forceps, and preserved in 5% formalin. The fishes were identified by Rehman (personal communication), measured and weighed and then released back into the pond water. The collected parasites were brought to the Parasitology Research Laboratory (Institute of Pure and Applied Biology), B.Z. University, Multan for further examination. The permanent mounts of the parasites (Cable, 1985) were identified with the help of keys given by Kabata (1985).

RESULTS AND DISCUSSION

Lernaeid parasites of C. catla

The occurrence of lernaeid parasites on *C. catla* was studied at Government Fish Hatchery, Pirowal (Punjab, Pakistan) from February 1999 to January 2000. Four species of parasites recovered during the present investigation were *Lernaea cyprinacea, L. polymorpha, L. oryzophila* and *L. lophiara*.

Different species of the genus *Lernaea* have been reported from other countries of the world. Shariff (1981) reported *L. piscinae* from bighead carp, *Aristichthys noblis* in Selangor, Malaysia. Lewis *et al.* (1984) reported *L. cruciata* from the pumpkinseed, *Lepomis gibbosus* in Southern Quebec, Canada. Noga (1986) collected *L. cruciata* (LeSuerer) from the mouthbass, *Micropterus salmoides* in the Chowan River, North Carolina and USA. Berry *et al.* (1991) found *L. cyprinacea* on stocked rainbow trout (*Oncorhynchus mykiss*) in Utah State, USA. Marcogliese (1991) reported *L. cyprinacea* on 3 species of fishes in Belews Lake, North Carolina. Kularatne *et al.* (1994) reported the *L. minuta* (Kuang) on the Javanese carp, *Puntius gonionotus* (Bleeker) in Malaysia.

Robinson and Avenant-Oldewage (1996) collected *L. cyprinacea* from *Labeo rosae* and *Oreochromis mossambicus* in the Olifants River in the Kruger National Park, South Africa. Ho and Kim (1997) reported five species of the genus *Lernaea* i.e., *L. arcuata* Soejanto from *Puntius goniotus, L. cyprinacea* L., from *Puntius partipentazona, L. oryzophila* Monod from *Puntius gonionotus, L. polymorpha* Yu from *Cyprinus carpio* and *L. taipila* from *Oreochromis mossambicus* in freshwater fishes of Thailand.

Lernaea spp., have also been reported from Punjab, Pakistan. Tasawar and Hussain (1999) reported five species of *Lernaea* namely, *L. polymorpha, L. cyprinacea, L. oryzophila, L. arcuata* and *L. lophiara* from *Labeo rohita*. Tasawar and Khurshid (1999) recovered five species of the genus *Lernaea, L. cyprinacea, L. polymorpha, Lernaea* sp., *L. oryzophila* and *L. lophiara* from mori, *Cirrhinus mrigala*. Tasawar and Naseem (1999) collected four species of the genus *Lernaea* namely, *L. cyprinacea, L. polymorpha, L. lophiara* and *L. ctenopharyngodonis* from *Ctenopharyngodon idella*. *Lernaea cyprinacea, L. polymorpha, L. oryzophila* and *L. lophiara* were recovered from

Labeo rohita (Arshad, 1999). From hybrid (*Catla catla* x *Labeo rohita*), *L. cyprinacea, L. polymorpha, L. lophiara* and *L. oryzophila* were recorded (Nazli, 1999). Six species of the genus *Lernaea, L. cyprinacea, L. polymorpha, L. oryzophila, L. lophiara, L. ctenopharyngodonis* and *L. arcuata* were reported from silver carp (Shahzad, 1999).

The results of the present study are only comparable with studies conducted by Arshad (1999), Nazli (1999), while the results are not in agreement with studies conducted by Tasawar and Hussain (1999), Tasawar and Khurshid (1999), Tasawar and Naseem (1999), Shahzad (1999) from Pakistan as well as in other parts of the world. This difference could be accounted on the basis of different hosts examined and due to different climatic conditions (when compared world-wide).

The overall prevalence of Lernaeid parasites of C. catla

A total of 168 ectoparasites were recovered from 120 *C. catla*. Out of 120 specimens 44 were infested. The percentage of infestation of parasites of *C. catla* was calculated (Table I) and it was observed that all four species of ectoparasites showed considerable variations with maximum values for *L. cyprinacea* (26.67%), *L. polymorpha* (25.83%), *L. oryzophila* (4.17%) and *L. lophiara* (2.5%).

Table I: The overall prevalence of Lernaeid parasites of *Catla catla* from Fish Hatchery Pirowal (Punjab).

Name of parasite	No. of fish examined	No. of fish infested	Prevalence (%)
Lernaea cyprinacea	120	32	26.67
L. polymorpha	120	31	25.83
L. oryzophila	120	5	4.17
L. lophiara	120	3	2.50

Various workers in Pakistan have studied the overall prevalence of *Lernaea* spp. For example Tasawar *et al.* (1999) examined the overall prevalence of parasites of *Cirrhinus mrigala*. The prevalences were *L. cyprinacea* (43.33%), *L. polymorpha* (34.16%), *Lernaea* sp. (14.16%), *L. oryzophila* (7.5%) and *L. lophiara* (4.16%). From *Labeo rohita* the prevalences for various species were *L. polymorpha* (5.83%), *L. cyprinacea* (5%), *L. oryzophila* (1.66%) and *L. lophiara* (1.66%) (Arshad, 1999). The prevalences of *L. polymorpha* (6.66%), *L. cyprinacea* (9.16%), *L. lophiara* (3.33%), *L. oryzophila* (2.5%), *L. ctenopharyngodonis* (2.5%) and *L. arcuata* (1.6%) were reported from silver carp examined by Shahzad (1999).

It is obvious from the results of the present study that *Lernaea* spp., have higher prevalences when compared with Arshad (1999) and Shahzad (1999). This could be explained on the basis that *C. catla* is more susceptible to lernaeid parasites as compared to other fishes present within the same habitat. While the prevalence of *Lernaea* spp., recorded during the present study is lower when compared with Tasawar *et al.* (1999) this could be due to the chemical control measures, taken at Pirowal Fish Hatchery in order to kill the parasites. This reasoning is supported due to initial similarity observed

between the prevalence of *Lernaea* spp., during the present study with Tasawar *et al.* (1999).

Mixed infestation of Lernaeid parasites of C. catla

The mixed infestation of parasites of *C. catla* was studied (Table II) and it was found that eleven fishes were infested with *L. cyprinacea*. *Lernaea polymorpha* was present on twelve hosts, while *L. cyprinacea* and *L. polymorpha* infested 14 fishes. Only one fish out of 120 was infested with *L. cyprinacea* and *L. oryzophila*. Same number of fish were infested with *L. cyprinacea* and *L. lophiara*. Three hosts were infested with *L. cyprinacea*, *L. polymorpha* and *L. oryzophila*. *Lernaea cyprinacea, L. polymorpha* and *L. lophiara* were present on one host. One host was infested with *L. cyprinacea, L. polymorpha, L. oryzophila* and *L. lophiara*. The overall results of multiple infestation showed that *L. cyprinacea* was the most abundant species than other parasites.

Table II: Mixed infestation of lernaeid parasites of *Catla catla* from Fish Hatchery Pirowal (Punjab)

Species combination	No. of fish examined	No. of fish infested
Lernaea cyprinacea	120	11
L. polymorpha	120	12
L. cyprinacea + *L. polymorpha*	120	14
L. cyprinacea + *L. oryzophila*	120	1
L. cyprinacea + *L. lophiara*	120	1
L. cyprinacea + *L. polymorpha* + *L. oryzophila*	120	3
L. cyprinacea + *L. polymorpha* + *L. lophiara*	120	1
L. cyprinacea + *L. polymorpha* + *L. oryzophila* + *L. lophiara*	120	1

According to Tasawar and Hussain (1999) *L. oryzophila* was the most abundant species than the other ectoparasites. *Lernaea polymorpha* was reported as the dominant species by Tasawar and Naseem (1999), while *L. cyprinacea* and *L. polymorpha* were reported as the dominant species by Tasawar and Khurshid (1999), Arshad (1999), Nazli (1999) and Shahzad (1999). The results of the present study are not comparable with the studies conducted by Tasawar and Hussain (1999), Tasawar and Khurshid (1999), Tasawar and Naseem (1999), Arshad (1999), Nazli (1999) and Shahzad (1999).

Stdies have shown that if two species of parasites are present within the same environment, competition will force one of them to be eliminated, or reduction in the number of one parasite is observed, due to competition for and food space (Noble and Noble, 1982). More combinations made by *L. polymorpha, L. cyprinacea* and *L. oryzophila* could be explained on the same basis that these species are more competent as compared to *L. lophiara* and *L. arcuata*.

Relationship between body weight and lernaeid parasites of C. catla

The maximum parasite infestation was recorded in the weight group (214-413 g) followed by 614-813, 14-213, 414-613, 814-1013, 1214-1413, 1014-1213 and 1414-1613 g, which had ectoparasites (74, 38, 23, 25, 3, 3, 1 and 1) respectively. There was no parasite in the weight groups 1614-1813, 1813-2013 and 2014-2220 g (Table III).

Table III: Relationship between body weight and lernaeid parasites of *Catla catla* from Fish Hatchery Pirowal (Punjab)

Species Name	Body weight of fish (g)										
	14-213	214-413	414-613	614-813	814-1013	1014-1213	1214-1413	1414-1613	1614-1813	1814-2013	2014-2220
L.cyprinacea	12	36	17	14	1	1	1	1	--	--	--
L.polymorpha	10	34	5	24	2	--	2	--	--	--	--
L.oryzophila	2	3	--	--	--	--	--	--	--	--	--
L.lophiara	1	1	1	--	--	--	--	--	--	--	--

It was concluded that minimum number of parasites in the highest weight group could be due to the acquired immunity by fish against these parasites. A decrease in infestation has also been reported by Tasawar and Hussain (1999), Tasawar and Khurshid (1999), Tasawar and Naseem (1999), Arshad (1999), Nazli (1999) and Shahzad (1999).

It could be possible that parasites are less able to establish themselves and mature on older fish. This may be due to the result of an immunological response in older fish.

Relationship between body length and lernaeid parasites of C. catla

Relationship between body length and parasites of *Catla catla* (Table IV) was recorded maximum in length group 26.5-32.4 cm followed by 20.5-26.4, 32.5-38.4, 14.5-20.4, 8.5-14.4 and 38.5-44.0 cm) which had ectoparasites (51, 49, 42, 20, 5 and 1) respectively.

Table IV: Relationship between body length and lernaeid parasites of *Catla catla* from Fish Hatchery Pirowal (Punjab)

Species name	Body length of fish (cm)					
	8.5-14.4	14.5-20.4	20.5-26.4	26.5-32.4	32.5-38.4	38.5-44.0
L. cyprinacea	2	10	22	33	15	1
L. polymorpha	3	7	26	14	27	--
L. oryzophila	--	2	1	2	--	--
L. lophiara	--	1	--	2	--	--

The results of the present investigation have revealed that length of the host seems to have influence on the parasite numbers. Similar findings have been reported by Tasawar and Hussain (1999), Tasawar and Khurshid (1999), Tasawar and Naseem (1999), Arshad (1999), Nazli (1999) and Shahzad (1999). Structure of the scales (in case of small fish) and the acquired immunity (in case of large fish) could be responsible for lower prevalences of these parasites.

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