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Parasitic Infestation in Different Fresh Water Fishes of Mini Dams of Potohar Region, Pakistan

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Abstract: The present study was conducted to investigate the parasitic profile and their level of infestation in and around Potohar region, i.e; Meinhart and Mangia mini Dams. A total of 78 fishes belonging to five different species, including; *Cyprinus Carpio* (Common carp), *Hypophthalmichthys molitrix* (Silver carp), *Ctenopharyngodon idella* (Grass carp), *Cirrhinus mrigala* (Mori) and *Labio rohita* (Rohu), were studied. Nine different species of parasites were found in these fishes, viz; *Chilodonella sp.* and *Trichdina sp.* (Protozoans), *Lernaea cyprinaceae*, *Ergasilus sp.* and *Argulus sp.* (Crustaceans), *Contracaecum* larvae and *Rhabdochona charsddensis* (Nematodes), *Grodactylus sp.* (monogenetic Trematode) and *Piscicola sp.* (fish leech). Generally the fish were found infected with one species of parasites while mixed infections were far less. *C. carpio* was found to be the most prone and *C. idella* the least infected with parasites. Among parasites *Lernaea cyprinaceae* and monogenetic Trematodes were the most frequent infectants. Parasitic infection increases with increase in temperature. The diversity of parasites was more pronounced than their frequency or number in this area and that for mini dams more intensive and regular monitoring of parasites is required for fisheries management.

Key words: Fresh water, fish, parasites, infection, mini dams

Introduction

Parasites are common and dangerous among fishes living in confined space such as aquarium, hatcheries, stocking ponds and tanks (Ali, 1990). Fishes usually have mixed infections of parasites. The degree of damage by infection is influenced to a large extent by the type and the number of parasites present (Bauer, 1941). Parasites can affect fish population by causing mortality, reduction in growth, weight loss and suppression of reproductive activity (Bauer, 1961). Isolated cases have occurred in both public and private sector fish farms. The common casual agents of parasitic infection are *lernaesa sp.*, *Argulus sp.*, *Dactylogyrus sp.* and *Monogenea sp.*, *Lernaecosis* which are reported to cause severe economic losses in fishery sector of Pakistan (ADB/NACA, 1991). Djajadiredja *et al.* (1983); Sharif and Somerville (1986) and Doravskika (1993) has reported Lernaecosis infection in both local and exotic fish species of Pakistan. *Argulus sp.*, *Ergasilus sp.* and *Lernaea sp.*, are reported to cause great loss to fish culturists in various countries (Sairg, 1971; Rogers, 1979). Keeping in view the severity of the losses due to parasites in the fisheries sector, different researchers in different parts of the world have conducted studies for the assessment of parasitic population by applying

various epidemiological techniques (Wilson, 1926; Jain, 1957; Wilmer, 1967; Ahmed, 1976; Sinhgai *et al.*, 1986; Oldewage and Van As, 1988). In Pakistan research on fish disease is at its early stage except taxonomic studies on fish parasites. The parasitic studies are on Crustaceans, Protozoans, Helminthes and Nematodes (Zaidi *et al.*, 1976 and 77; Bilquees, 1975 and 76; Muzamil, 1983; Jafri, 1993). Little work on lethal parasites of fish has been carried out in Pakistan which can benefit fish culturists in and around Potohar region.

Present study was designed to make a survey for the parasitic infections, including their identification, their prevalent frequencies and host specificity in the Meinhart Dam and Mangia Mini Dam reservoir of Potohar region in and around Islamabad.

Materials and Methods

The study sites were Meinhart Dam and Mangia Mini Dam Reservoirs. Meinhart Dam is a mini dam situated in Barani tract of Potohar plateau. It was constructed in 1987 and has a total area of 2 acre and average depth of 6 feet. Mangia Mini Reservoir is privately owned and is situated near village Mangia at a distance of about 9 km from Fateh Jang town in F.J district Attock 60 km from Islamabad. The

Table 1: Water quality parameters of meinhart and mangia mini dams from April to July 1998

Determinent	Meinhart dam	Mangia mini dam
Temperature	21-29C°	20-27.5C°
PH	8-8.5	8-8.5
Dissolved O ₂	6.5-10.0(mg L ⁻¹)	7-10(mg L ⁻¹)
Alkalinity	150-200(mg L ⁻¹ of CaCO ₃)	150-185(mg L ⁻¹ CaCO ₃)
Acidity	42-61(mg L ⁻¹)	40-80(mg L ⁻¹)
Chloride	4.2-7.8(mg L ⁻¹)	4-0-7.0(mg L ⁻¹)
CO ₂	4-4.5(mg L ⁻¹)	4.5-5.5(mg L ⁻¹)
Hardness	139-210(mg L ⁻¹)	130-190(mg L ⁻¹)
Ammonia	0.7-1.3(mg L ⁻¹)	.25-.04(mg L ⁻¹)
Nitrite	Nil	Nil

surface area of the reservoir is over 7.5 acre and was established in 1980 for fish culture and irrigation.

Fish sampling was done by using cast nets of one-inch mesh size and gill nets of varying mesh sizes. The sampling was done from April to July 1998. Water quality of Meinhart dam and Mangia Dam were recorded from the surface water at the time of collection with HACH Kit (Model 16900-01, Table 1). Fish were identified and preserved in 4% formalin in glass jars. The Total Length (TL), Standard Length (SL) and weights were recorded.

For the isolation of ectoparasites like crustaceans, protozoans and other gill parasites, external surfaces and gills were carefully examined with help of magnifying glass. Crustaceans were isolated and preserved in 70% alcohol and wet smears were prepared from the skin and gills of fishes to locate Protozoans. The smears were allowed to air dry and fixed in absolute methanol for 20 minutes, stained (Giemsa) for 20 minutes, de-stained in distilled water and finally mounted in DPX (Batricados, 1984). To locate other parasites gills were scraped with fine forceps and stained mounted like the others.

To trace internal parasites (Nematodes) fish were incised and scraped with forceps and brush. They were also processed and mounted. All the parasites obtained were identified with the help of keys by Yamaguti, 1963; Manwell (1961), microphotographs were made and measurements of the parasites were recorded in millimeters, with the help of ocular micrometer.

Results and Discussion

During this research nine parasites were recovered from 78 fishes of five different species. The total percentage of infection was 70.51% out of which 51.28% infection was found in Meinhart Dam while 19.23% in Mangia Mini Reservoir. The individual parasitic infection of both study sites is shown in Table 5. Most of the fishes investigated in this study, showed a variety of parasitic infections, except *C. idella* and *C. mrigala* from the Meinhart Dam, which were infected only with *L. cyprinaceae* and *C. mrigala* with *Gyrodactylus* sp. in Mangia Dam. Highest prevalence of parasitic infection was found in *C. carpio*

Table 2: Weight and length of fish examined for Parasitic infection

No.	Fish species	Total number	Size range (cm)	Weight range (gm)
1	<i>C. carpio</i>	32	12.0-34.5	226-502
2	<i>H. molitrix</i>	19	21.7-48	300-1278.5
3	<i>C. idella</i>	6	22.5-24.9	201-273
4	<i>C. mrigala</i>	14	14.3-19.7	73.2-198
5	<i>L. rohita</i>	7	15.6-18	243-356

Table 3: Prevalence of Parasites in different fishes of Mienhart dam

No.	Host	No. of fish examined	No. of fish infected	Percentage of infection	Parasites found
1	<i>C. carpio</i>	22	10	45.45	<i>L. cyprinaceae</i> , <i>Argulus</i> sp., <i>Ergasilus</i> sp., <i>Piscicola</i> sp., <i>Trichdina</i> sp., <i>Chilodella</i> sp.
2	<i>H. molitrix</i>	12	6	50.00	<i>Piscicola</i> sp., <i>Contracaecum</i> sp
3	<i>C. idella</i>	6	2	33.33	<i>L. cyprinaceae</i>
4	<i>C. mrigala</i>	10	4	40.00	<i>L. cyprinaceae</i>
5	<i>L. rohita</i>	7	4	57.14	<i>L. cyprinaceae</i> , <i>R. charsddensis</i>

Table 4: prevalence of Parasites in different fishes of Mangia mini reservoir

No.	Parasites	Meinhart dam		Mangia dam	
		No of fish Infected	%Infection	No of fish Infected	%infection
1	<i>L. cyprinaceae</i>	17	29.8	-	-
2	<i>Ergasilus</i> sp.	2	3.50	8	38.09
3	<i>Argulus</i> sp.	4	7.01	-	-
4	<i>Piscicola</i> sp.	6	10.52	-	-
5	<i>Trichdina</i> sp.	2	3.50	3	14.28
6	<i>Chilodonella</i> sp.	1	1.75	-	-
7	<i>Grodactylus</i> sp.	4	7.01	2	9.52
8	<i>Contracaecum</i> sp.	2	3.50	2	9.52
9	<i>R. charsddensis</i>	2	3.50	-	-
Total		40	70.17	15	71.41

Table 5: Incidence of Individual Parasitic Infection in fishes of Mienhart and Mangia Dams

No.	Host	No. of fish examined	No. of fish infected	Percentage of infection	Parasites found
1	<i>C. carpio</i>	10	7	70.00	<i>Ergasilus</i> sp., <i>Trichdina</i> sp.
2	<i>H. molitrix</i>	7	5	71.50	<i>Ergasilus</i> sp., <i>Contracaecum</i> sp.
3	<i>C. mrigala</i>	4	2	50.00	<i>Grodactylus</i> sp.

Table 6: Prevalence of parasites in Meinhart and Mangia Dams during study period

Months	Percentage of occurrence of disease during four months	
	Meinhart Dam	Mangia Dam
April	10.02	9.05
May	16.00	16.12
June	24.01	25.26
July	20.14	21.00
Total	70.17%	71.43%

and low prevalence in *C. idella*, which suggests that the former is more prone to infection as compared to the latter one. Previous studies have shown that the exoparasitic infestations are more common in fish of warm water ponds at higher temperatures (Anjum, 1986), which is in agreement with the present findings.

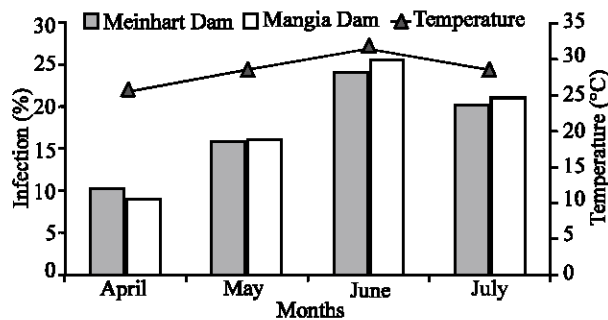


Fig. 1: Prevalence of Parasites in Meinhart and Mangina dams during study period

Among Protozoans only two parasites namely, *Chilodonella* sp. and *Trichodina* sp. were found in skin and gills of *C. carpio*. The observed number of protozoans indicate their low prevalence. Among ciliates these two species have been reported to be the most pathogenic (Sairg, 1971) and they are cosmopolitan in distribution. High mortality has been reported in pond cultured fish species in Israel (Sairg, 1971) and *C. carpio* culture in Russia (Bauer, 1961), due to heavy *Chilodonella* sp. infection. Although, the incidence of this parasitic infection in Pakistan has not been frequently reported. However, the present findings suggest its low prevalence, therefore, a comprehensive investigation should be carried out to find its exact incidence.

Only one species of monogenetic Trematode i.e; *Gyrodactylus* sp. was recovered from *H. molitrix* and *C. Mrigala*. Trematodes have been reported earlier in Pakistan in Kalri Lake (Sindh) by Zaidi *et al.* (1976 and 1977) and Bilquees (1979). In the present study younger fish of less than one year of age were infected with this parasite in keeping with the previous observations.

Two species of Nematodes; *R. charsdensis* and *Contracaecum* larvae were found in *L. rohita* and *H. molitrix* respectively. In Pakistan, *Rhabdochona* sp. has been reported in freshwater fish; *Shizothorax labiatus* and *S. plaoiostomus* from NWFP (Siddiqi and Khattak, 1984). Genus *Contracaecum* consists of a large number of species including *C. aori* reported by Khan and Yasmeen (1969). In the present study, *Contracaecum* larval forms were found from both study sites, on the same host, which showed close morphological resemblance with the *C. aori*, with minor differences, which may be due to the larval form of the parasite.

Piscicola sp., among fish leeches (Hirudinea), was recovered from *H. molitrix* and *C. carpio*, in Meinhart Dam. The frequency of infection was greater in the former species which may be due to the fact that temperate regions serve as most suitable habitat for leeches to parasitize carp (Brock, 1983).

Crustaceans were dominant among the found species of parasites. The recovered species were *Ergasilus* sp., *Argulus* sp. and *L. cyprinacea*, from which *L. cyprinacea* was the most abundant one (Table 5). Out of the five species all except *H. molitrix* were found infected with it and *C. carpio* was the most infected one. Larval stages of *L. cyprinacea* were also recovered, which resembled Cyclopes. *C. carpio* was infected with *Argulus* sp. The frequency of this parasite was found low, which may be due to the fact that this parasite leaves the host as soon as its host dies. The third crustacean parasite, *Ergasilus* sp. was found in *C. carpio* and *H. molitrix*, from the Meinhart Dam and Mangia Dam, respectively. The frequency of *Ergasilus* sp. was greater in the Mangia Dam (Tables 4 and 5). So far, seven different species of *Ergasilus* have been reported from South Asian region, which includes a new specie, *Ergasilus pakistanicus*, identified by Jafri (1993), in Pakistan

L. cyprinacea and *Argulus* spp are the most commonly found parasites in Pakistan. They have caused several mortalities in fish farms and are responsible for creating health problems at fish hatcheries in Pakistan (ADB/NACA, 1991) and other parts of the world.

Gun'Kovskii and Khudolei (1989) concluded from their study that there exist a direct relation in temperature and parasitic infection and that parasitic infection is promoted by the increase in temperature. These observations are in agreement with the work reported herein, as the rate of infection was increased with the increase in temperature (Table 6, Fig. 1). The present study was undertaken during the hot summer season and larval stages of the parasite were also found in this study, indicating that the high water temperature created suitable conditions for their reproduction.

The findings of this study conclude that the occurrence of nine different parasites is a great diversity, though the frequency is not so high. The presence of relatively more parasites in *C. carpio*, suggests its low resistance to the parasitic infection. Among the parasites studied, *L. cyprinacea* is most frequently found followed by *R. charsddensis* and then *Argulus* sp. while *Chilodonella* sp. was the least common one among the infected fish. In Mangia Mini Reservoir *Gyrodactylus* sp. was the most infectious one followed by *Ergasilus* sp and *Trichodina* sp., while *Contracaecum* sp. was the least common one. The rate of infection increases with the increase in temperature.

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