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A Survey on Helminth Parasites of Fishes from Jaikwadi Dam, Maharashtra State of India

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Abstract

Ninety samples of *Clarias batrachus* (n=20), *Heteropneustes fossilis* (n=22), *Tilapia mossambica* (n=28) and *Wallago attu* (n=20) was caught in Jaikawadi Dam of Paithan Thasil of Aurangabad District in December and January 2010, all of them are carnivorous fishes commonly available in Jaikwadi dam. Nine helminth species including three cestodes (*Bothriocephalus acheilognathi*, *Polyonchobothrium clarias* and *Proteocephalus glanduliger*), four nematodes (*Paracamallanus cyathopharynx*, *Capillaria*, *Contracaecum* sp. larvae and *Eustrongylides* sp. larvae), out of two trematodes, one was digenean (*Glossidium pedalum*) and other was acanthocephala (*Acanthogyrus*) were found in *Clarias batrachus, Tilapia mossambica, Heteropneustes fossilis, Wallago attu.*

1. Introduction

With the ever increasing demand for natural resources such as water due to high populations as well as minimizing the effects of drought, the government constructed dams which supply water to the local communities for farming, industry and general house hold use. Such developments have brought with them benefits that can be exploited by the locals such as commercial and/or subsistence fishing activities. This is a stimulated study in fish ecology (Payne, 1986) [1], the species present, fish population dynamics, tropic interrelationships and causes of mortality (Lowe, 1975) [2]. Godavari river which is the largest river of southern India, and the Jaikwadi Dam (Nath Sagar) is one of the largest irrigation projects in the Indian state of Maharashtra. It is a multipurpose project. Its water is used mainly to irrigate agricultural land in the drought-prone Marathwada region of Maharashtra. It also provides water for drinking and industrial usage to nearby towns and villages and to the municipalities and industrial areas of Aurangabad and Jalna. The surrounding area of the dam has a Bird Sanctuary.

Data on the helminth parasites of fishes in Jaikwadi Dam, limited to studies. No meaningful work has been done on helminth parasites of fish on this dams that are an important source of fish to the local communities. Parasitic diseases of fish are very common throughout the world and are of particular importance in the tropics. Fresh water fish serve as definitive and/or intermediate hosts in the life cycles of many helminth parasites (Schimidt, 2000) [3]. Parasites affect fish health, growth and survival. The aim of the present study was to determine the helminth parasite fauna of fish species in Jaikwadi Dam and the status of their parasite communities (prevalence, mean intensity, abundance and dominance).

2. Materials and Methods

Jaikwadi Dam was built in 1976 in Paithan Thasil (19^0 28' 48.13"N and $75^0$22'48.04"E) of the Aurangabad District in Maharashtra State of India, to provide water for general household use and irrigation. Jayakwadi is one of the largest earthen dams in Asia. Dam is located at west side of Paithan Thasil at 19^0 28' 58.07"N and 75^0 22' 10.02"E. The height of dam is approximately 40 meter and width of dam is approximately 22km long. Fishes such as *Labeo rohita, Catla catla, Cirrhinus mrigala, Cyprinus carpio* other exotic spp. like ctinopharyngdon, *Hypothalamus*, *Chela* spp. are commonly found in this dam. Some of the carnivorous fishes such as *Ophiocephalus, Clarias batrachus, Heteropneustes fossilis, Tilapia mossambica, Wallago attu,* etc. are commonly found in this reservoir.

A total of ninety samples of four fish species collected with hoop net, two-man seines, fyke net and gill net namely, *Clarias batrachus* (n=20), *Heteropneustes fossilis* (n=22), *Tilapia mossambica* (n=28) and *Wallago attu* (n=20) were collected in December to January 2010 in Jaikwadi Dam. An attempt was made to collect nearly an equal number of fishes of which most were of the small and medium size. The fishes were killed immediately before examination, since it was found that the small monogenetic trematodes rapidly disintegrated after the death of the fish. The examinations were made with a binocular stereoscopic microscope. When

possible, helminths were removed from the host and identified while in the living state. Weight and length was measured after collection of fishes. Common necropsy and parasitological techniques were used to isolate the parasites. Parasites were preserved in 4% formalin. Worms were cleared in lactophenol before identification using standard keys (Khalil, 1991, Parpena, 1996) [4,5]. The mean intensity was determined by dividing the total number of collected parasites by the number of infected fish samples, while abundance was calculated by dividing the total number of collected parasites by the number of (infected and uninfected) fish samples. The dominance of a parasite species was calculated as N/N sum (where N=abundance of a parasite species and N sum = sum of the abundance of all parasite species found.

3. Results and Discussions

In this study, a total of 357 worms of nine helminth species including four nematodes (*Paracamallanus cyathopharynx*, *Capillaria, Eustrongylides* sp. Larvae and *Contracaecum* sp. larvae), three cestodes (*Bothriocephalus acheilognathi*, *Polyonchobothrium clarias* and *Proteocephalus glanduliger*), one digenean trematode (*Glossidium pedalum*), and one acanthocephala (*Acanthogyrus*) were found in *Clarias batrachus, Heteropneustes fossilis, Tilapia mossambica,* and *Wallago attu.* The fish biometrics is shown in Table 1. Tables 2-4 show the prevalence, mean intensity, range, abundance and dominance of the collected parasites. A total of 300 helminths of five species were found in the samples of *Clarias batrachus* (Table 2). 100% of the fishes are infected. The collected nematodes, *P. cyathopharynx* and the cestode *P. clarias* had the highest prevalence of 80 % although *P. cyathopharynx* had the highest mean intensity and dominance of 25.5 and 68.9% respectively. Two *Clarias batrachus* had above 65 *P. cyathopharynx* in their stomachs. The cestode *P. glanduliger* and the digenean trematode *G. pedalum* had the least abundances of 0.6 and 1.6 respectively.

According to Table 3, a total of 21 helminths were collected in the samples of *Heteropneustes fossilis* 33.3% of the fish had no helminth parasites. Three nematode species was collected, *Eustrongylides* larvae had the highest prevalence of 27.7% and the highest dominance of 60.9%. The mean intensities of all the collected 5 helminth species were low. Only one helminth species, the acanthocephala *Acanthogyrus* was collected in *Tilapia mossambica* specimens and its prevalence was low (16.7%) (Table 4). Similarly, only one helminth species *Contracaecum* larvae were recorded in *Wallago attu* specimens with a prevalence of 40% (Table 4). Other collected parasites were piscine coccidian that was found in the intestines of two *Clarias batrachus* with oocysts ranging from 500-1200. The ectoparasite *Argulus* was collected in all the fish species (range 0-3). Most *Argulus* was collected in the mouth cavity and on the fins. There are a few reports about the parasites of fish in Jaikwadi Dam. In the current study no *Contracaecum* larvae were collected in *Clarias batrachus* but in *Tilapia mossambica* and *Wallago attu*. The mean intensity of *Contracaecum* sp. larvae collected was low. *Paracamallanus cyathopahrynx*. The heavy *P. cyathopharynx* infections in the stomach of *Clarias* is similar to the findings of Mashego and Saayman in 1980 and Boomker in South Africa in 1982. An interesting finding was the occurrence of the trematode *Glossidium pedalum*, the cestodees *Bothriocephalus acheilognathi*, *Polyonchobothrium clarias* and *Proteocephalus glanduliger* in *Clarias batrachus* only. In South Africa, Douellou in 1992, reported occurance of *P. clarias* in *Clarias batrachus* [8] . Tapeworms are widespread throughout all over world (Campbell, 1999) [9]. Major water systems of India and demonstrate a high degree of host specificity, with Siluriform fish being the most common hosts for both monozoic and segmented cestodes. The recovery of the adult plagiochird trematode *Glossidium pedalum* in the intestines of *Clarias batrachus* is similar to the findings of Mashego in South Africa. [10] The current study showed that *Clarias batrachus* and *Tilapia mossambica* had the greatest diversity of helminth parasites. Unlike other fish species, *Clarias batrachus* had the highest worm burdens. This could be attributed to the habitat favoured by *Clarias batrachus* that consists of turbid environments and shore areas which are covered with vegetation, as was the case of Jaikwadi Dam. This habitat also favours the intermediate hosts of cestodes as well as trematode digeneans. Hoffman in 1967 reported that in the mud habitat second intermediate hosts of many fish digeneans such as larvae of aquatic insects like Ephemeroptera, Odonata, Chironomidae and various Crustacea are found and form part of the diet of *Clarias batrachus,* [11]. Another reason for the recovery of a large number of helminths in *Clarias batrachus* could be related to the large size of *Clarias batrachus* as compared to other fish species (Table 1). The occurrence of very few helminth parasites in *Heteropneustes fossilis* and *Wallago attu* could be attributed to resistance to helminth infections. It is not surprising to find *Contracaecum* and *Eustrongylides* larvae in some of the fish species in Jaikwadi Dam. Migratory Birds are always found in the vicinity of the dam in the month of November to January of every year. Aquatic birds are important in the ecology of fish parasites because most helminths complete their life cycles in the bird host. Another interesting finding of our study was the recovery of piscine coccidia in *Clarias batrachus* only. *Coccidiosis* in fish usually manifests itself as a chronic infection and

mortality is gradual and overlooked in most fish farms. [18] In conclusion, the obtained results show that helminths are important parasites of fishes in Jaikwadi Dam, and detailed studies on the seasonal variations of these helminth parasites is recommended.

Table 1 Biometric characteristic (weight and total length) of *Clarias batrachus*, *Heteropneustes fossilis*, *Tilapia mossambica* and *Wallago attu* caught in Jaikwadi Dam

Fish	Weight (g) ±SD	Total length (cm) ±SD
Clarias batrachus	1078.9±187.3 (506-1220)	48.3±6.4 (31.5-51)
Heteropneustes fossilis	376.1±54.8 (240-500)	22.8±2.2 (14.3-25.5)
Tilapia mossambica	365.4±21.6 (348-400)	27.2±3.7 (16.2-28.2)
Wallago attu	306.0±33.5 (200-456)	28.8±1.6 (21.5-27.5)

Table 2 The prevalence, mean intensity, abundance and dominance of some helminths in *Clarias batrachus*

Parasites	No. of Infested fish	Prevalence %	Mean intensity ±SD	Range	Abundance ±SD	Dominance %
P. *cyathopharynx*	9	85	25.5±29.5	0-72	20.4±27.9	68.9
B. acheilognathi	7	70	5.0±6.90	0-18	3.0±5.6	10.1
P. clarias	10	88	5.0±4.08	0-11	4.0±4.2	13.5
P. glanduliger	5	75	1.0±0.00	0-3	0.6±0.5	2.1
G. pedalum	7	50	4.0±4.20	0-9	1.6±3.1	5.4

Table 3 The prevalence, mean intensity, abundance and dominance of some helminths in *Tilapia mossambica*

Parasites	No. of Infested fish	Prevalence %	Mean intensity ±SD	Range	Abundance ±SD	Dominance %
P. *cyathopharynx*	4	11.1	1.0±0.0	0-1	0.1±0.3	10
Eustrongylides	3	27.7	2.4±0.6	0-3	0.7±1.1	60.9
Contracaecum	4	11.1	1.0±0.0	0-1	0.1±0.3	10
Capillaria	5	16.6	1.3±0.6	0-2	0.2±0.5	14.5
Acanthogyrus	4	5.6	1.0±0.0	0-1	0.1±0.12	4.5

Table 4 The prevalence, mean intensity, abundance and dominance of some helminths in *Heteropneustes fossilis and Wallago attu*

Parasites	No. of Infested fish	Prevalence %	Mean intensity ±SD	Range	Abundance ±SD	Dominance %
P. *cyathopharynx*	4	26.3	1.5.±0.7	0-2	0.3±0.6	100
Eustrongylides	7	50	1.5.±0.6	0-2	0.6±0.8	100

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