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Prevalence of Helminthes Parasite of Freshwater Fishes from Yeldari Dam (M.S.) India

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Abstract*— The prevalence of helminth infection in the freshwater fishes from Yeldari Dam was studied during the raining season (July 2023 to June 2024). From 10 species of Indian fishes namely Trout, Tilapia mossambica, Labeo rohita, Chana punctatus, Mastacembelus armatus, Catla catla, Clarias batrachus, Cyprinus carpio, Mystus seenghala and Notopterus notopterus, 20 species of helminth parasite were collected. A total of 847 fish samples were examined for parasites. A total of 464 were observed parasites. This study thus highlights on the prevalence of helminths parasite details of therefore is, the only one that has given some details on the endoparasitic organisms infecting freshwater fish species due to seasonal variation, parasite infection, variation in intensity of infection, variation in parasite fauna with the diet of the host and variation in infection with the habitat type.

Index Terms: Prevalence, helminth parasites, Yeldari Dam and Freshwater fish.

I. INTRODUCTION

Parasites are a big concern for freshwater and marine fishes worldwide. They are especially prevalent in the tropics and are a key stumbling block to the development of farmed fish in Nigeria (Nwadike, *et al.,* 2023). Depending on the parasite species and load, the impacts of parasites on fish include nutritional devaluation, altered biology, and behaviour, lowered immune capability, induction of blindness, morbidity, mortality, growth, and low fecundity, and mechanical injuries (Ejere, *et al*., 2014). The possibility of disease transmission from fish to humans through fish consumption is a public health concern (Nwadike, *et al.*, 2023). One of the most important factors that influence seasonality is the temperature which has a direct impact on free-living developmental stages or the parasite within the hosts.

Changes in the distribution of acanthocephalans with the change in seasons have been observed in many fish hosts (Sheema *et al.,* 2015). This is also true for other helminth parasites like digenetic trematodes where the seasonal changes in the prevalence and abundance are related to cercarial emergence with an increase in water temperature (Imani-Baran *et al*., 2013). Seasonal variation of helminth parasites, including parasites of public health importance in fishes has been studied by many authors from different parts of the world and their existence is influenced by many factors (Uruku and Adikwu, 2017 and Zhang *et al.*, 2017). In India, a seasonal study of different helminth parasite infection in fishes has been reported by several authors (Fartade, *et al.*, 2017 and Wali, *et al.*, 2016).

The extent of parasite infection can be expressed as the intensity, prevalence and abundance of infection (Lohmus and Bjorklund, 2015), therefore, to know the extent of helminth infections in some selected freshwater fishes of Manipur, the present work was undertaken and it showed that the parasites are most prevalent during monsoon and premonsoon. Hence, control measures can take this factor into consideration and treatment provided during these seasons can be effective in controlling the helminth infections. Knowledge on occurrence, seasonality, diversity and infection indices in fishes by parsites may highlight the importance of parasite studies in controlling and executing preventive measures of fish diseases caused by parasites. The results of the present study provide rudimentary knowledge of parasite spectrum and its seasonality which will help in management to prevent infections. Different management strategies have been suggested to prevent introduction of disease to healthy fish and also to prevent propagation of the existing disease.

A. Study Site

Yeldari dam is a large irrigation project constructed by the Irrigation department, Government of Maharashtra on the river Purna, taluka Jintur, district Parbhani (M.S) India. The dam was constructed in October 1968.The study area is 200 km away from Chhatrapati Sambhajinagar (Department of Zoology, Shivaji arts, science and commerce college, Kannad, Chhatrapati Sambhajinagar-431 004). Location of sampling site is in the North of taluka Jintur, district Parbhani and South East of Aurangabad and situated on latitude 19°44' 39.67" N and longitude 76°43' 34.32" E (Google Earth, 2009). The physiography of the study area has cold climate in winter and is hot and dry in summer. Average rainfall is 685 to 762 mm. Reserve forests are observed to the North, North East, South West, East and small conical hilly ranges of Ajanta are observed towards West, North West, North and North East. South and South East have the plane area. The maximum height of the region is 468 m. (Toposheet Index no 56A/10, C-1 Parbhani district). The river Purna is one of the tributaries of river Godavari, sub basin Purna, basin Godavari. River Purna originates from hilly regions of Ajanta

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ranges district Chhatrapati Sambhajinagar, (M.S). The river flows from North West to East. (Toposheet index no 56A/10, C-1) The river travels 300 km through four districts (Chhatrapati Sambhajinagar, Jalna, Buldhana, and Parbhani) and joins Godavari at Kantheswar taluka Purna, district Parbhani and hence called as life line of that region.

II. MATERIALS AND METHODS

1) Study area: Yeldari Dam, Prbhani

2) Study periods: July 2023 to June 2024.

3) Study organism: Fresh water fishes (*Trout, Tilapia mossambica, Labeo rohita, Chana punctatus, Mastacembelus armatus, Catla catla, Clarias batrachus, Cyprinus carpio, Mystus seenghala* and *Notopterus notopterus*).

4) Collection of host fishes: All live fresh fish specimens of all sizes, weight and sex were collected from Yeldari dam, Parbhani. The specimens were brought in the laboratory alive in a small container with water and maintained in glass aquaria.

5) Methodology:

a) Total and Standard Length and Weight measurement:

The total and standard length of the fish were measured in centimetre (cm) using a measuring board. Fish were weighed to the nearest gram (g) using weighing balance (Paperna, 1996).

b) Examination for Helminth Parasites:

In the laboratory all samples were examined and processed as per standard protocol. External examination of each fish for the helminths ectoparasites was conducted using hand lens. Each gill was examined individually for the presence of parasite. Fishes were opened up dorso-ventrally and all the internal organs were examined separately. The entire digestive system was removed and placed in a petri dish with saline for further examination.

c) Processing of parasites for identification:

The helminth parasites were fixed in hot 10% formalin, cestodes and acanthocephala were fixed in AFA solution following stainingby borax carmine. After staining, parasites were washed with distilled water, dehydrated in ascending grades of alcohol, cleared in xylene and mounted in D.P.X. Helminth parasites were identified up to class level on the basis of available taxonomical characters as described by Yamaguti, (1958); (1961a); (1961b) and (1963).

d) Formula and statistical Analysis

Prevalence, Abundance and Mean density were determined by following the formula proposed by Margolis *et al.*, (1982).

$$\text{Prevalence \%} = \frac{\text{Total number of host infected}}{\text{Total number of host examined}} \times 100.$$

$$\text{Mean Intensity} = \frac{\text{Total number of parasite}}{\text{Total number of host infected}}$$

$$\text{Abundance} = \frac{\text{Total number of parasite}}{\text{Total number of host examined}}$$

III. RESULTS AND DISCUSSION

The results obtained in the present study are depicted in table 1 and figure 1 to 2. A total number of 847 freshwater fish specimens of *Trout, Tilapia mossambica, Labeo rohita, Chana punctatus, Mastacembelus armatus, Catla catla, Clarias batrachus, Cyprinus carpio, Mystus seenghala* and *Notopterus notopterus* were examined, for the presence of helminths parasites. Out of a total of 847 fishes, 478 hosts were found to be infected with different helminth parasites shown in table 1. Prevalence of parasites in freshwater fishes for the study of parasitic infection in all are edible fish species from Yeldari Dam and examined properly. We were examined and found that maximum prevalence of cestode was (51.18%) showed by *Clarias batrachus, Channa punctatus, Mystus seenghala* and *Trout*. According to Marwa E. Aly *et al.*, (2024) the parasitological analysis of the collected fish, *Clarias gariepinus* had the highest infection rate 64% (32/50) compared to *Oreochromis niloticus* 56% (56 / 100). Quadriacanthus spp. (50%), Contracecum spp. (50%), Trichodina spp. (56%), Myxobolus spp. (55%), Cryptosporidium spp. (50%), and encysted metacercaria [microscopic (55%), and macroscopic (35%)] were the parasites found in Nile tilapia fish.

In contrast, the identified parasites in catfish included microscopic encysted metacercaria (60%) and Quadriacanthus spp. (54%), Trichodina spp. (64%), Myxobolus spp. (44%), Henneguya spp. (40%), and Cryptosporidium spp. (56%). It is evident from the their study that a significant frequency of numerous zoonotic parasites was found in the fish under examination. As a result, control measures in fish farms are required to prevent the spread of these parasites, which pose a risk to public health. The prevalence of trematode was (52.23%) showed by *Catla catla, Clarias batrachus, Channa punctatus, Mystus seenghala* and *Notopterus notopterus*. The maximum prevalence of nematode was (60.84%) showed by *Channa punctatus* and *Labeo rohita* shown in table 1 and 2. Similarly, Mgbemena *et al.*, (2020) and AbdElrahman *et al.*, (2023) state that, all animal protein consumed worldwide comes from fish, which also provides many people with jobs and money at the household and national levels. To address the needs of fish as a source of protein, fish farming in natural and aquaculture systems has greatly improved.

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Table 1: Prevalence %, Intensity % and Abundance % of helminth parasite found in freshwater fishes of Yeldari dam

Month	Name of Parasite	No. of host examined	Total no. of host infected	No. of host infected	Total no parasite collected	Prevalence %	Intensity %	Abundance %
Jul. 2023	Cestode	57	31	19	15	33.33	0.78	0.26
	Trematode			7	9	12.28	1.28	0.15
	Nematode			5	2	8.77	0.4	0.03
Aug. 2023	Cestode	67	32	22	15	32.83	0.68	0.22
	Trematode			8	4	11.94	0.5	0.07
	Nematode			2	6	2.98	3	0.10
Sep. 2023	Cestode	83	46	29	14	34.93	0.48	0.16
	Trematode			0	0	0	0	0
	Nematode			17	2	20.48	0.11	0.02
Oct. 2023	Cestode	57	28	18	1	31.57	0.05	0.01
	Trematode			2	3	3.50	1.5	0.052
	Nematode			8	7	14.03	0.87	0.12
Nov. 2023	Cestode	61	40	22	25	36.06	1.13	0.40
	Trematode			8	9	13.11	1.12	0.14
	Nematode			10	14	16.39	1.4	0.22
Dec. 2023	Cestode	89	41	34	39	38.20	1.14	0.43
	Trematode			14	17	15.73	1.21	0.19
	Nematode			19	31	21.34	1.63	0.34
Jan. 2024	Cestode	84	47	25	42	29.76	1.68	0.5
	Trematode			8	14	9.52	1.75	0.16
	Nematode			2	26	2.38	13	0.30
Feb. 2024	Cestode	58	36	24	39	41.37	1.62	0.67
	Trematode			4	17	6.89	4.25	0.29
	Nematode			8	22	13.79	2.75	0.37
Mar. 2024	Cestode	47	21	12	49	25.53	4.08	1.04
	Trematode			2	24	4.25	12	0.51
	Nematode			7	10	14.89	1.42	0.21
Apr. 2024	Cestode	57	27	18	52	31.57	2.8	0.91
	Trematode			8	22	14.03	2.75	0.38
	Nematode			1	4	1.75	4	0.07
May-24	Cestode	89	51	34	72	38.20	2.11	0.80
	Trematode			12	29	13.48	2.41	0.32
	Nematode			5	1	5.61	0.2	0.01
Jun. 2024	Cestode	98	64	39	44	39.79	1.12	0.44
	Trematode			8	9	8.16	1.12	0.09
	Nematode			17	14	17.34	0.82	0.14
Total		**847**	**478**	**478**	**703**	**665.94**		**10.29**

We were examined and found that maximum prevalence of cestode was (35.22%) showed by rainy season. The maximum prevalence of trematode was (10.46%) showed by winter season. And maximum prevalence of nematode was (13.53%) showed by winter season (Table-2). The result could be found that the maximum number of infected freshwater fishes in rainy season showed in figure -1. The result also found that the cestode type of helminth parasites

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were show maximum in a*ll helminth parasite infections found in freshwater fishes of Yeldari dam shown in figure-2*..

Table 2: Seasonal prevalence %, Intensity % and Abundance % of helminth parasite found in freshwater fishes of Yeldari dam

Genera	Seasons	Prevalence%	Intensity%	Abundance%
Cestode	Rainy	35.22	0.76	0.27
	Winter	33.89	1	0.33
	Summer	34.16	2.6	0.85
Trematode	Rainy	8.09	0.72	0.07
	Winter	10.46	0.13	0.13
	Summer	9.66	0.37	0.37
Nematode	Rainy	12.39	1.08	0.07
	Winter	13.53	4.22	0.24
	Summer	9.01	2.09	0.16

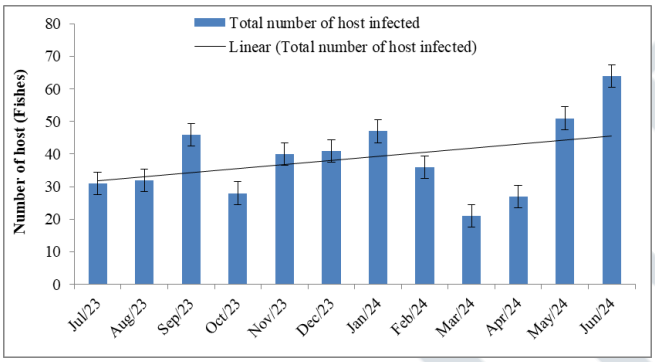


Figure 1. Monthly helminth parasite infections found in freshwater fishes of Yeldari dam

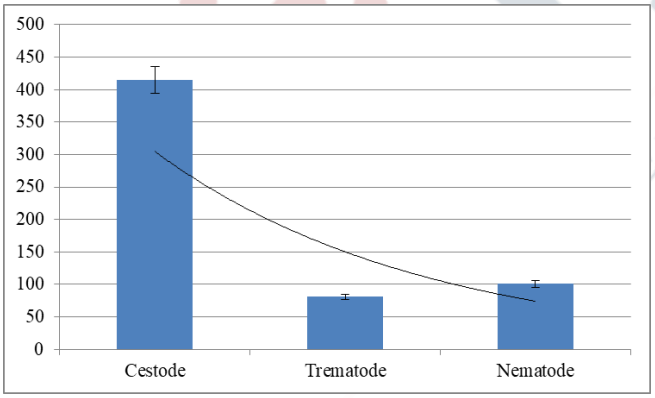


Figure 2. All helminth parasite infections found in freshwater fishes of Yeldari dam

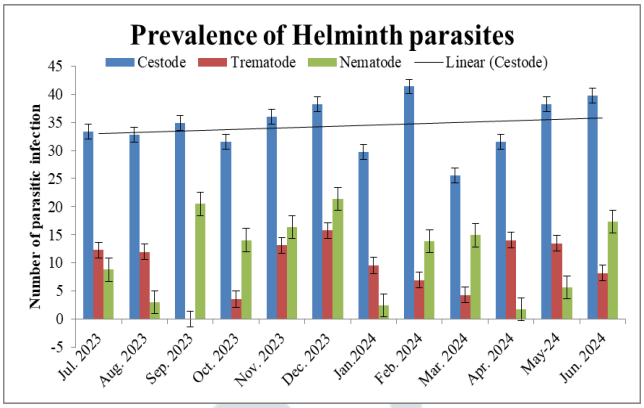


Figure 3: Prevalence of cestode, trematode and nematode infections found in freshwater fishes of Yeldari dam

There were many environmental factors that is responsible for availability and interaction of parasitic agent with the host like temperature, cold, humidity and dissolved oxygen level in aquatic body. According to Kennedy (1977) and Rohde (1993) the factors responsible for influencing the parasite infection are the temperature, feeding habits of host, availability of infective host and parasite maturation. Such parameters can be easily studied in freshwater fishes. It also reported prevalence of helminth parasites and compare with the other fish. Similar findings were reported by (Pawar 2022) and revealed that the Catfish were infected with large number of parasites in winter months, because the environmental conditions are favorable in winter months. The prevalence and parasitic infestation in freshwater fishes have also been by several researchers (Bhure et al., 2016; Bommakanti, 2016; Gupta and Sharma, 2015; Kumari and Perveen, 2017).

IV. CONCLUSION

The present study was concluded that, the *Channa punctatus*, *Clarias batrachus seenghala* and *Notopterus notopterus* fishes is most heavily infected fish species as compare to other species as studied. This study thus highlights on the parasitic infection according to the length and weight. We accomplished that the freshwater fishes harbour a wide range of helminth parasites especially trematodes. Freshwater fishes, (*Trout, Tilapia mossambica, Labeo rohita, Chana punctatus, Mastacembelus armatus, Catla catla, Clarias batrachus, Cyprinus carpio, Mystus seenghala* and *Notopterus notopterus*) were infected with large number of parasites in winter months than the other warmer months because the environmental conditions are favorable in winter months as the water warm but not cold. Moderate temperatures of the aquatic body enhance the productivity of various microbes as well as zooplanktons and phytoplanktons compared to high temperature of summer months. This may corresponds to the peak in the feeding activity of the fish together with the richness in the transitional host that is crustaceans, smaller mollusks and fishes leading in high infections.

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