



Research Paper

Biodiversity of Helminth Parasites of Freshwater Fish from Parichha dam, district Jhansi, Bundelkhand region, Uttar Pradesh, India

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Abstract: Helminth parasites pose a significant challenge to the well-being, development and output of freshwater fish, resulting in financial setbacks for the fisheries and aquaculture industries. This study explored the frequency and seasonal changes of helminth infections in freshwater fish from Parichha dam in Jhansi district, Uttar Pradesh, India. A total of 264 fish representing four species were collected and examined between November 2025 to September 2026. Among them, 66 fish were infected by four major groups, namely tapeworm, nematodes, trematodes and acanthocephalans. Infection varied among fish species, with the prevalence of overall all helminth parasites highest recorded in winter (40.63%), moderate in rainy season (18.06%) whereas lowest in summer (14.58%). Highest intensity and density in winter season 2.23% and 0.91%, moderate in summer season 1.57% and 0.23% and lowest in rainy season 1.00% and 0.18 %.

Tapeworm highest intensity and density in winter season 0.72% and 0.29%; moderate in rainy season 0.31% and 0.06% and lowest in summer season. Trematodes highest intensity in summer season 0.79%; moderate in rainy season 0.62% and lowest in winter 0.51% and highest density in winter season 0.21 % and their lowest density in summer and rainy season 0.11%. Nematodes highest intensity and density found in winter 0.64% and 0.26%; moderate in summer season 0.50% and 0.07% and lowest in rainy season. Acanthocephalans highest intensity and density in winter 0.36% and 0.15%; moderate in summer season 0.29% and 0.04% and lowest in rainy season 0.08% and 0.01%.

Keywords: Biodiversity, Helminth, Freshwater fish, Seasonal parameters, Parichha dam, district Jhansi, Bundelkhand region, U.P., India

Introduction: Freshwater fish are an important source of nutritious food and livelihood for millions of people in India. They also play a major role in supporting rural economies, particularly in Bundelkhand region of Uttar Pradesh, India. Despite their ecological and economic value, freshwater fish are frequently affected by parasitic diseases that reduce their health, growth and survival. Among these, helminths including Tapeworm, Trematode, Nematode and Acanthocephalans are commonly reported from Indian freshwater ecosystems (Kumar et al., 2023). These parasites damage host tissues, compete for nutrients and reduce the overall condition and productivity of infected fishes (Bandyopadhyay et al., 2024). Infected fish often exhibit poor growth, reduced body condition and lower market value, while heavy infections may cause mortality and financial losses to fishers and aquaculture farmers (Deshmukh et al., 2021).

In India it is estimated that about 10 million tons of fish are required to meet the annual demand of fish proteins as compared to as an actual annual production of only 3.5 million tons (Shukla et al, 1998). Very scanty work on the helminth parasite of catfish of Bundelkhand region of Uttar Pradesh were carried out. Notable contributions were made in population dynamics of helminth parasites by earlier researchers Dogial, 1961, Kennedy, 1968, Anderson et al., 1982, Dobson et al 1994, Jadhav et al., 2006. Pathan et al., 2017, 2018, Pardeshi et al., 2025, Kumar et al. 2026 and Jyotsna et al. 2026. Parasitic biodiversity continue to threaten freshwater fisheries in India by affecting fish growth, survival and production, emphasizing the need for regular disease monitoring and effective management practices (Mustafa et al., 2024). Habitat alteration caused by reservoir construction, urbanization and

agricultural activities has also been reported to influence host-parasite interactions in freshwater ecosystems (Sures et al., 2026). Helminth biodiversity and distribution in Indian freshwater fish (Sultana et al., 2024). Parasites of fish constitutes one of the major problems to fish health. Keeping in view, importance of helminth parasitic infection to freshwater fish, present study was designed to evaluate seasonal prevalence of helminthes parasitizing freshwater fish for three different seasons i.e. summer, rainy and winter season from various parts of Bundelkhand region of Uttar Pradesh, India.

Materials and Methods: In this study, various internal parts of four species of fish viz. *Heteropneustes fossilis*, *Clarias batrachus*, *Channa punctata* and *Mastacembelus armatus* were examined for helminth biodiversity during the period of November 2025 to September 2026 from Parichha dam, district Jhansi, Bundelkhand Region (U.P.), India. Tapeworms were collected, preserved in 5% formalin and Trematodes, Nematodes and Acanthocephalans preserved in 70% alcohol. These fish and seasonal helminth biodiversity were prepared for identification by standard methods Jayaram, 1999, Bush et al. 1997 and Morgolis et al. 1982.

Discussion: Biodiversity of helminth parasites are presented (Table 1, Figure 1). Infection varied among fish species, with the prevalence of overall all helminth parasites highest recorded in winter, moderate in rainy season whereas lowest in summer. Highest intensity and density in winter season, moderate in summer season and lowest in rainy season (Table 2, Figure 2). Tapeworm highest intensity and density in winter season, moderate in rainy season and lowest in summer season (Table 3, Figure 3,4). Trematode highest intensity in summer

season, moderate in rainy season and lowest in winter and highest density in winter season and their lower density in summer and rainy season (Table 4, Figure 3,4). Nematode highest intensity and density found in winter, moderate in summer season and lowest in rainy season (Table 5, Figure 3,4). Acanthocephalans highest intensity and density in winter, moderate in summer and lowest in rainy season (Table 6, Figure 3,4). Farhaduzzaman et al., 2010, reported high prevalence of parasites in the Indian Major Carp *Labeorohita* (Ham.) in Rajshahi, Bangladesh and highest prevalence (75%) and mean density (10.44) of parasites were found in the month of December and lowest (20%) in the month of February. Bhure et al, 2014 reported incidence of infection of *Senga* sp., *Gangesiasp.*, *Proteocephalus* sp. Infected to *Channa* sp. In summer season (76.66%), 73.33% & 70.00%) followed by winter (65.21%, 52.17% & 56.52%) whereas infection was low in monsoon (36.84%, 26.31% & 31.57%). Srivastav et al. 2007, reported highest prevalence during summer season and lowest in rainy season. Narayan et al. 2017 reported high incidence of infection were recorded in summer season (21.66%) followed by winter season (28.33%) whereas low in monsoon season (26.66%). Narayan et al., 2016 reported high incidence of infection were recorded in summer season (73.75%) followed by winter season (51.25%) whereas low in monsoon season (48.75%). Narayan et al. 2016, reported that high incidence of infection were recorded in winter season (78.33%) followed by monsoon season (63.33%) whereas low in summer season (46.66%), Narayan et al. 2019, incidence of infection were recorded in winter season (27.08%) followed by monsoon season (22.91%)

whereas low in summer season (19.58%). Narayan et al. 2019, recorded of infection were recorded in winter season (0.306%), monsoon season (0.234%) whereas low in summer season (0.147%) and winter, monsoon and summer intensity, 1.333%, 1.195% and 1.068%. Pathan et al. 2018, recorded infection of *Gangesia* sp. in *Wallago attu* during 2011-2012 maximum prevalence (50.0) in male was recorded in the months of January, whereas minimum (0) in August, September, October in rest of months between (42.86) to (37.50). The maximum prevalence (42.86) in female was recorded in the months of November and January. Whereas minimum (0) in August and September, in rest of months between (37.50) to (28.50) and in 2012-2013 maximum prevalence (57.14) in male was recorded in the months of March, whereas minimum (0) in July, August and September. In rest of months between (12.50) to (37.50). The maximum prevalence (42.86) in female was recorded in the months of, February, May, November and January. Whereas minimum (0) in July. In rest of months between (12.50) to (37.50). Sahreen et al. 2024, observed the highest infection during winter, suggesting that seasonal patterns differ according to parasite species, host biology, and local environmental conditions. Abdu et al. 2025, recorded significantly higher helminth prevalence during the rainy season than during the dry season, emphasizing the role of rainfall and seasonal ecological conditions in parasite transmission and Vilas et al. 2026, reported highest prevalence and intensity in monsoon respectively 54.5 % and 2.30% and lowest prevalence in winter season 26.3% and intensity in summer season 1.60%.

Table 1. Seasonal host and parasite counts:

Season	Host	Infe cted	Tape- worms	Trema- todes	Nema- todes	Acantho- cephalans	Total
Winter	96	39	28	20	25	14	87
Summer	96	14	0	11	7	4	22
Rainy	72	13	4	8	0	1	13
Total	264	66	32	39	32	19	122

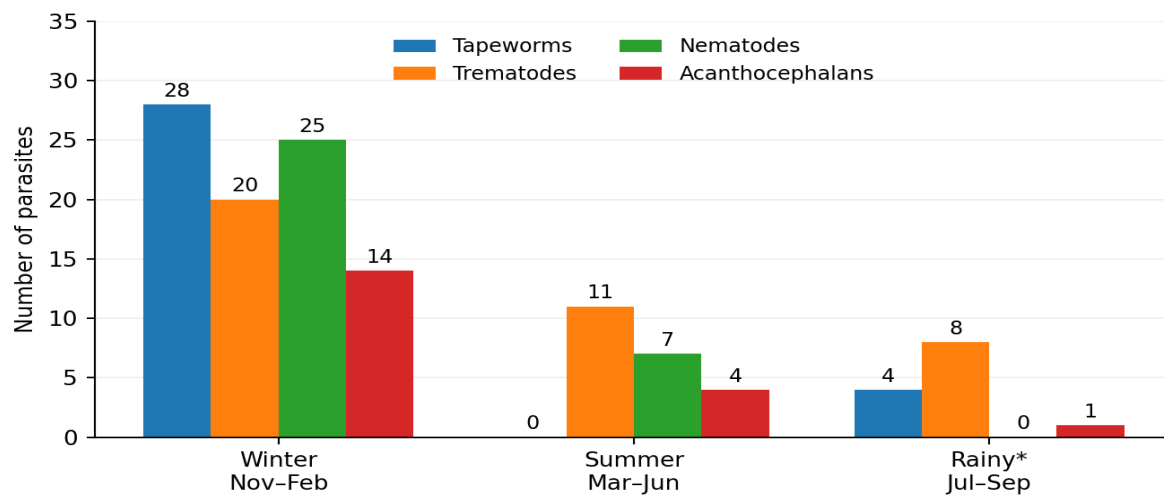


Figure 1. Seasonal host and parasite counts

Table 2. Combined seasonal infection indices

Season	Prevalence (%)	Mean intensity	Relative density
Winter	40.63	2.23	0.91
Summer	14.58	1.57	0.23
Rainy	18.06	1.00	0.18
Total	25.00	1.85	0.46

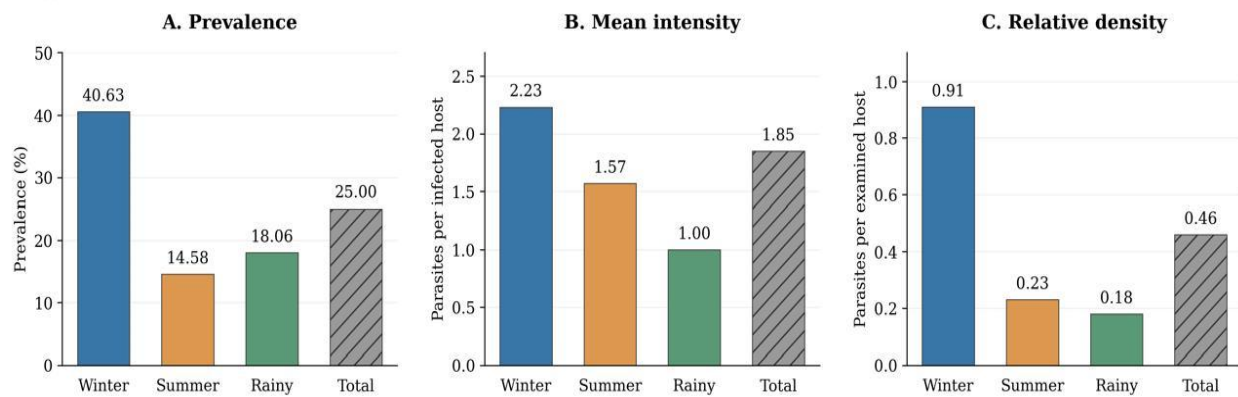


Figure 2. Combined seasonal infection indices

Seasonal calculations by parasite group

Table 3 . Seasonal calculations for Tapeworms

Season	Fish examined	Recorded infected fish	Parasites obtained	Intensity ratio	Relative density
Winter	96	39	28	0.72	0.29
Summer	96	14	0	0.00	0.00
Rainy	72	13	4	0.31	0.06
Total	264	66	32	0.48	0.12

Table 4. Seasonal calculations for Trematodes

Season	Fish examined	Recorded infected fish	Parasites obtained	Intensity ratio	Relative density
Winter	96	39	20	0.51	0.21
Summer	96	14	11	0.79	0.11
Rainy	72	13	8	0.62	0.11
Total	264	66	39	0.59	0.15

Seasonal calculations by parasite group

Table 5. Seasonal calculations for Nematodes

Season	Fish examined	Recorded infected fish	Parasites obtained	Intensity ratio	Relative density
Winter	96	39	25	0.64	0.26
Summer	96	14	7	0.50	0.07
Rainy	72	13	0	0.00	0.00
Total	264	66	32	0.48	0.12

Table 6. Seasonal calculations for Acanthocephalans

Season	Fish examined	Recorded infected fish	Parasites obtained	Intensity ratio	Relative density
Winter	96	39	14	0.36	0.15
Summer	96	14	4	0.29	0.04
Rainy	72	13	1	0.08	0.01
Total	264	66	19	0.29	0.07

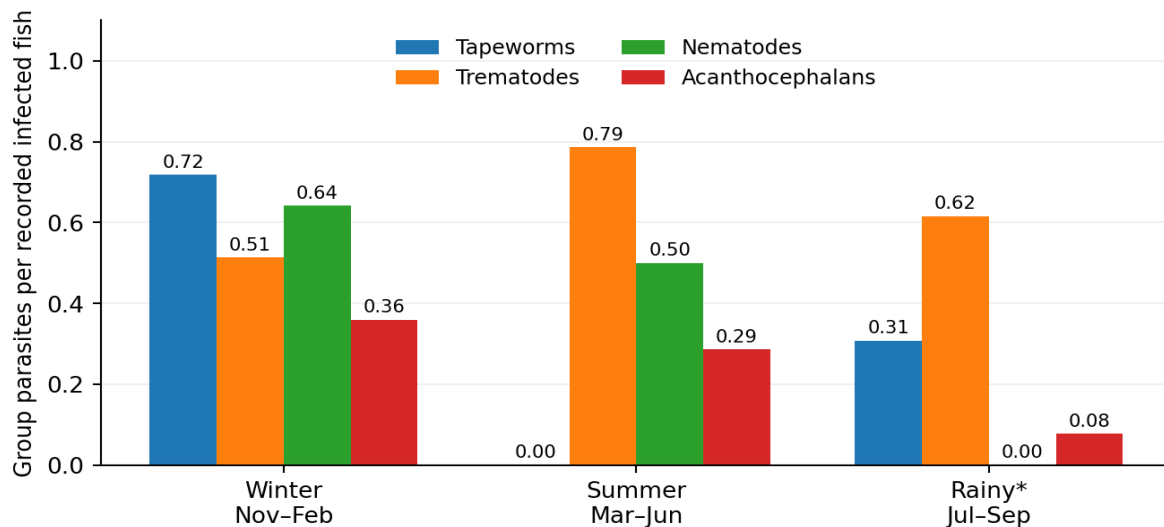


Figure 3. Seasonal intensity ratios by parasite group

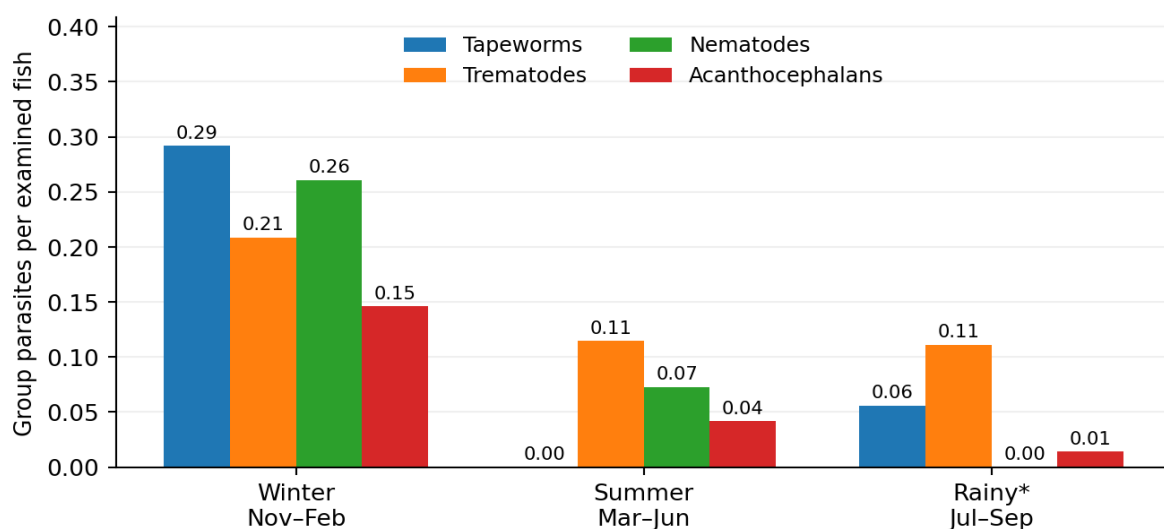


Figure 4. Seasonal relative density by parasite group

Results: The prevalence of overall all helminth parasites recorded in winter (40.63%), moderate in rainy season (18.06%) whereas lowest in summer (14.58%). Highest intensity and density in winter season 2.23% and 0.91%, moderate in summer season 1.57% and 0.23% and lowest in rainy season 1.00% and 0.18 %. Tapeworm highest intensity and density in winter season 0.72% and 0.29%; moderate in rainy season 0.31% and 0.06%; lowest in summer season. Trematodes highest intensity in summer season 0.79%; moderate in rainy season 0.62% and lowest in winter 0.51% and highest density in winter season 0.21 % and their lowest density in summer and rainy season 0.11%. Nematodes highest intensity and density found in winter 0.64% and 0.26%; moderate in summer season 0.50% and 0.07% and lowest in rainy season. Acanthocephalans highest intensity and density in winter 0.36% and 0.15%, moderate in summer season 0.29% and 0.04% and lowest in rainy season 0.08% and 0.01%.

Conclusion: The current study's results offer valuable initial insights into the presence and spread of helminth parasites in freshwater fish in Parichha dam, district Jhansi, Bundelkhand region of U.P., India. By analyzing the seasonal variations in infection rates and considering the impact of fish feeding habits and seasonal variation. Similar recommendation helminth biodiversity and freshwater ecosystem health by Sures et. al. 2023 and Selbach et. al. 2024. Seasonal environmental changes of water such as temperature, pH and conductivity effect on the occurrences of parasites from aquatic host Kennedy 1976.

Statements and Declarations

No endangered fish species were used in the present study.

Conflict statements: The author declares that he has no conflict of interest.

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