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Studies on Seasonal variation of Cestode Parasite Infection in the Freshwater Fish *Mastacembelus armatus* from Nanded District (MS), India

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Abstract
The present study investigates the seasonal variation of cestode parasite infection in the freshwater fish *Mastacembelus armatus* over a one-year period from October 2022 to September 2023 in Nanded District, Maharashtra, India. A total of fish specimens were examined monthly for intestinal cestode infection. The results revealed that parasitic infection persisted throughout the year, indicating continuous host-parasite interaction in the ecosystem. Seasonal analysis showed moderate infection levels during early winter, followed by a marked increase from March to May, during which the highest prevalence (up to 76.92%) and parasite abundance were recorded. The infection intensity declined during the monsoon months, reaching the lowest prevalence in September (16.67%). Maximum parasite abundance and infection index were recorded in March, indicating a peak transmission period, while January exhibited the lowest infection levels. Interestingly, although prevalence was low in September, infection intensity was relatively high, suggesting heavier parasite loads in fewer infected hosts. These seasonal fluctuations appear to be strongly influenced by environmental factors such as temperature, rainfall, and host feeding behavior. The study highlights the ecological significance of seasonal variation in parasite dynamics and emphasizes the need for continuous monitoring of fish health in freshwater ecosystems.

Keywords: Cestode parasites, Freshwater Fish, *Mastacembelus armatus*, Seasonal variation.

Introduction

Freshwater fishes are a crucial, affordable source of high-quality protein and micronutrients for millions of people worldwide. Ecologically, they act as key regulators in aquatic food webs and are vital biological indicators for maintaining the overall health of rivers, lakes, and wetlands. Fish are an important component of aquatic ecosystems and serve as a major source of protein for human consumption. Freshwater ecosystems support a wide diversity of fish fauna and their associated parasite communities (Kennedy, 2009; Marcogliese, 2004) [6, 8].

Host–parasite interactions in aquatic environments are regulated by both biotic and abiotic factors such as temperature, water quality, habitat structure, host behavior, and availability of intermediate hosts (Esch and Fernández, 2013; Poulin, 2011) [4, 14]. Seasonal variation plays a crucial role in influencing parasite life cycles, transmission dynamics, and host susceptibility (Chubb, 1979; Timi and Poulin, 2003) [3, 17]. Environmental parameters such as temperature, rainfall, and water flow significantly affect helminth survival and development (Sharma, 2016) [15]. Higher temperatures often accelerate parasite development and increase transmission rates, while monsoon conditions may reduce infection due to dilution effects and habitat changes.

The freshwater fish *Mastacembelus armatus* (zig-zag eel) is widely distributed in India and inhabits rivers, ponds, and reservoirs (Jayaram, 1999) [5]. Being a benthic and carnivorous feeder, it is highly susceptible to helminth infections, particularly cestodes (Paperna, 1996) [11]. Cestodes (Class: Cestoda) are intestinal endoparasites with complex life cycles involving intermediate hosts (Schmidt, 1986). Their transmission is highly influenced by environmental conditions and host ecology (Hoffman, 2019). Although helminth infections in freshwater fishes of India have been reported, detailed studies on seasonal cestode infection in *M. armatus* from the Nanded region remain limited. Therefore, the present study aims to analyse seasonal variations in cestode infection and their relationship with environmental factors.

Material and Method

Study Area and Period: The study was conducted in Nanded District, Maharashtra, India, from October 2022 to September 2023.

Sample Collection: Fresh specimens of *Mastacembelus armatus* were collected monthly from local fish markets representing catches from nearby freshwater bodies. Each specimen was examined for intestinal cestode infection.

Parasitological Examination: The alimentary canal was dissected and examined for cestode parasites. Recovered parasites were washed in physiological saline followed by distilled water to remove debris and preserved in 4% formalin.

Staining and Identification: Specimens were processed through graded alcohol dehydration, stained using Harris hematoxylin and borax carmine, cleared in xylene, and mounted in DPX. Identification was carried out using standard taxonomic keys (Yamaguti, 1959[18]; Bhure, 2008[2]). Drawings were prepared using a camera lucida. Cestode identified at genus level are *Senga, Ptychobothrium* and *Polyoncobothrium.*

Epidemiological Parameters: Prevalence, intensity, density, and infection index were calculated following Margolis *et al*. (1982) and Pennycuick (1973) [9, 13].

Fig 1: *Mastacembelus armatus*

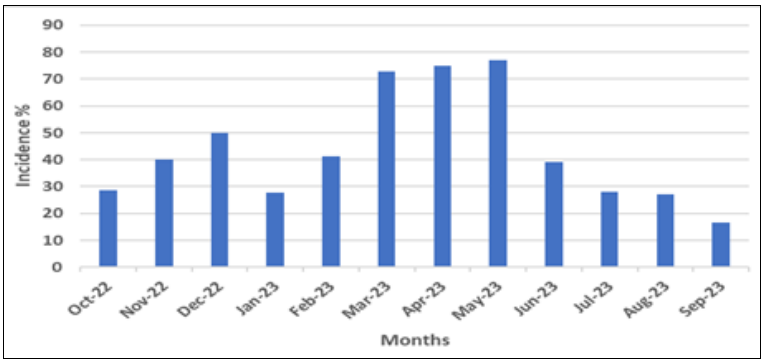
Result

Cestode infection was recorded throughout the entire study period, indicating that parasitism in *Mastacembelus armatus* is a continuous and persistent ecological feature of the host population. However, the level of infection showed clear seasonal fluctuations. The highest prevalence of infection was observed during late summer and early pre-monsoon months, with May recording the maximum value (76.92%), followed by April (75.00%) and March (72.73%).

In contrast, the lowest prevalence was recorded in September (16.67%), indicating a sharp decline in infection during the post-monsoon period. Similarly, parasite abundance also varied considerably across months, with the highest number of parasites recovered in March (32 parasites), suggesting a period of intense transmission, while the lowest parasite count was observed in January (8 parasites), indicating comparatively reduced infection pressure.

Table 1: Monthly Seasonal variation of Cestode parasite in freshwater fish *Mastacembelus armatus* from Nanded.

Sr. No.	Months & Year	No. of Host Examined	No. of Host Infected	No. of Parasite Collected	Incidence %	Intensity %	Density %	Index of Infection %
1	October-2022	14	04	14	28.57	3.50	1.00	0.29
2	November-2022	15	06	16	40.00	2.67	1.07	0.43
3	December-2022	16	08	13	50.00	1.63	0.81	0.41
4	January- 2023	18	05	08	27.78	1.60	0.44	0.12
5	February-2023	17	07	14	41.18	2.00	0.82	0.34
6	March-2023	22	16	32	72.73	2.00	1.45	1.06
7	April-2023	24	18	28	75.00	1.56	1.17	0.88
8	May-2023	26	20	30	76.92	1.50	1.15	0.89
9	June-2023	23	09	26	39.13	2.89	1.13	0.44
10	July-2023	25	07	12	28.00	1.71	0.48	0.13
11	August-2023	22	06	18	27.27	3.00	0.82	0.22
12	September-2023	18	03	20	16.67	6.67	1.11	0.19



Graph 1: Monthly Seasonal variation of Cestode parasite in freshwater fish *Mastacembelus armatus* from Nanded.

Seasonally, the infection pattern showed moderate levels during winter months, followed by a pronounced increase from March to May, when both prevalence and parasite load reached their peak. During the monsoon period, infection levels declined noticeably, reflecting reduced transmission efficiency under changing environmental conditions. The lowest infection was consistently observed in September, marking the period of minimal parasitic activity within the annual cycle. Overall, these patterns clearly demonstrate that cestode infection in the host fish is strongly influenced by seasonal environmental variation, with warmer months favoring higher parasite transmission and accumulation.

Discussion

Graphical analysis revealed significant monthly variations in the number of hosts examined, number of hosts infected, and total number of parasites collected. The highest number of hosts examined (25–26 individuals) was recorded in May

and July, whereas the lowest sampling effort (14 individuals) was made in October.

The infection level was highest in May, with the maximum number of infected hosts (20), while the lowest infection was observed in September (3 infected hosts). Similarly, parasite recovery showed marked variation, with the highest number of parasites recorded in March (32 parasites), indicating a period of acute infection, whereas the lowest parasite count was recorded in January (8 parasites).

The highest infection incidence was recorded in May (76.92%), followed by April (75.00%) and March (72.72%), indicating a clear peak in infection from late winter to early summer. In contrast, the lowest incidence occurred in September (16.66%), with relatively low values also observed in January (27.77%) and August (27.27%). These patterns suggest that seasonal environmental conditions strongly influence infection dynamics, with warmer months favoring parasite transmission and post-monsoon periods showing reduced infection pressure.

The monthly variation in infection parameters further supports this pattern. The highest intensity was observed in September (6.6), while the lowest values occurred in January, February, April, and July (0.4), indicating periods of reduced parasite load. Density reached its maximum in April, May, June, and September (1.1), while the lowest density was recorded in January and July (0.4). The infection index was highest in March (1.05), followed by May (0.88) and April (0.87), whereas the lowest values were observed in January (0.12) and July (0.13). Overall, these results confirm clear seasonal fluctuations in parasite burden, with distinct periods of high and low infection pressure.

The present findings are supported by earlier studies. Khadse and Jayshingpure (2025) reported that 40 out of 120 fish specimens were infected in Bindusara Reservoir, with highest prevalence, mean intensity, and infestation index observed during summer, particularly in *M. armatus*, while the lowest infection occurred during winter, especially in *Wallago attu.* These findings highlight seasonal dependence of cestode infection and species-specific variation in susceptibility.

Pardeshi and Vahule (2025) also reported seasonal variation in helminth infection of *M. armatus*, with highest prevalence in summer, moderate in winter, and lowest during monsoon. Out of 414 fish examined, 55 were infected, suggesting that temperature, rainfall, and feeding behavior play important roles in parasite transmission.

The present study is also consistent with Palke (2025), who reported highest cestode prevalence during warmer months and lower infection during winter in fish from Somthana Dam, suggesting that temperature and environmental conditions enhance parasite development and transmission. However, contrasting results were reported by Gavai *et al*. (2024), who observed highest cestode abundance during March–May 2023 with very high prevalence values (86.36%, 81.81%, and 76.00%), indicating that local ecological conditions can significantly modify seasonal patterns.

Pawar (2021) reported seasonal variation in cestode infection in *Wallago attu* from December 2003 to November 2005, where highest prevalence occurred during the rainy season, followed by winter, and lowest during summer, further indicating species-specific and habitat-dependent variability.

Taken together, these findings demonstrate that although seasonal fluctuations in cestode infection are consistently observed, the exact peak period varies among studies depending on local environmental conditions, host availability, and ecological factors influencing parasite transmission.

Conclusion

The study confirms that cestode infection in *Mastacembelus armatus* exhibits distinct seasonal variation, with peak infection during summer and reduced infection during monsoon. Continuous presence of parasites throughout the year indicates stable host–parasite interaction in the ecosystem. Seasonal monitoring is essential for understanding parasite ecology and managing fish health in freshwater systems.

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References

1. Anderson RM. Population biology of parasitic infections. Nature,1974:251:389–393.
2. Bhure DB. Faunal Diversity of Helminth Parasites of freshwater fishes from Maharashtra State India. Ph.D. Thesis, Dr.B.A.M.U.Aurangabad. 2008
3. Chubb JC. Seasonal occurrence of helminths in freshwater fishes part II. *Trematoda*. Advances in parasitology,1979:17:141–313.
4. Esch GW, Fernandez JC. A functional biology of parasitism: Ecological and evolutionary implications. Springer, 2013.
5. Jayaram KC. The freshwater fishes of the Indian region, 1999.
6. Kennedy CR. The ecology of parasites of freshwater fishes: the search for patterns. Parasitology,2009:136(12):1653–1662.
7. Khadse VG, Jaysingpure VM. Studies on Infection of Intestinal Cestode Parasite of Freshwater Fishes from Pali Bindusara Reservoir Beed. Journal of Classified Research Techniques & Advances, 3(2), 30–35.
8. Marcogliese DJ. Parasites: small players with crucial roles in the ecological theater. EcoHealth,2004:1(2):151–164.
9. Margolis L, Esch GW, Holmes JC, Kuris AM, Schad G. The use of ecological terms in parasitology. Journal of Parasitology,1982:68(1):131–133.
10. Nanware SS, Bhure DB, Deshmukh VS. Incidence of infection of cestode genus *Senga* parasitic in *Mastacembelus armatus*. Flora and Fauna,2015:21(1):31–36.
11. Paperna I. Parasites, infections and diseases of fishes in Africa: An update, 1996.
12. Pawar RT, Hiware CJ, Pathan TS. Seasonal Population Dynamics of Cestode Parasites from *Mastacembelus armatus*. World Journal of Fish and Marine Sciences,2016:8(1):01–05.
13. Pennycuick L. Differences in parasite infections in three-spined sticklebacks. Journal of Zoology,1973:170(4):407–423.

14. Poulin R. The ecology of parasites in freshwater ecosystems, 2011.
15. Sharma B. Studies on prevalence of cestode parasites in *Channa punctatus* from Meerut (U.P.), India. Journal of Applied and Natural Science,2016:8(1):485.
16. Singh HS, Raizada A. Seasonal variation of helminth parasites in Indian major carps. Journal of Parasitic Diseases,2012:36:12–18.
17. Timi JT, Poulin R. Parasite community structure and seasonal variation, 2003.
18. Yamaguti S. Systema Helminthum. II. The Cestodes of Vertebrates, 1959.