

Occurrence and Seasonal Variation of Intestinal Cestodes of *Channa punctata* from Muzaffarpur District, Bihar, India

Dr. Jitendra Rajak¹ and Surendra Kumar²

¹Professor, Principal, Nalanda Mahila College, Biharsharif, Nalanda, Bihar. INDIA.

²Professor, Department of Zoology, Maa Shakumbhari University, Punwarka, Saharanpur, Uttar Pradesh - 247120, INDIA.

Corresponding Author: jitendramub@gmail.com



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ABSTRACT

The present study investigated the occurrence and seasonal variation of intestinal cestodes in *Channa punctata* collected from Muzaffarpur District, Bihar, India, during January–December, 2025. A total of 240 fish specimens were examined, of which 98 were found infected, yielding an overall prevalence of 40.83%. Three cestode taxa, namely *Lytocestus indicus*, *Senga* spp., and *Circumoncobothrium* spp., were recorded, with *L. indicus* showing the highest prevalence (17.50%). Seasonal analysis revealed the highest infection rate during the monsoon season (56.67%) and the lowest during winter (26.67%). Female fish exhibited slightly higher prevalence (44.17%) than males (37.50%), while infection increased progressively with fish length, reaching a maximum prevalence of 50.00% in the 21–25 cm length group. Chi-square analysis indicated significant seasonal variation in infection prevalence ($p < 0.05$), highlighting the influence of environmental factors on parasite transmission. The findings provide valuable baseline information on the epidemiology of intestinal cestodes in *C. punctata* and emphasize the importance of regular parasitological monitoring for effective fish health management and sustainable fisheries development in the region.

Keywords- *Channa punctata*; Intestinal cestodes; *Lytocestus indicus*; Prevalence; Seasonal variation; Bihar.

I. INTRODUCTION

Freshwater fishes constitute an important source of animal protein and livelihood for millions of people worldwide. Among the freshwater fishes of India, *Channa punctata* (Bloch, 1793), commonly known as the spotted snakehead, is widely distributed and economically important due to its high nutritional value, medicinal significance, and market demand (Jhingran, 1991; Talwar and Jhingran, 1991).

Parasitic infections represent one of the major biological constraints affecting fish health, growth, reproduction, and productivity. Fish parasites can adversely affect growth, feeding efficiency, reproductive performance, and survival, resulting in considerable economic losses in fisheries and aquaculture (Dogiel, 1961; Roberts and Janovy, 2009). Among endoparasites,

cestodes are frequently encountered in the intestinal tract of freshwater fishes where they compete with the host for nutrients and may cause tissue damage, reduced growth, anemia, and increased susceptibility to secondary infections (Kennedy, 1975; Chandra, 2006).

The occurrence and distribution of fish parasites are influenced by numerous environmental and biological factors including water temperature, rainfall, dissolved oxygen, host age, feeding behavior, and the abundance of intermediate hosts (Marcogliese, 2001; Pietrock and Marcogliese, 2003). Seasonal changes often affect both prevalence and intensity of infection by modifying ecological conditions essential for parasite development, transmission, and survival. Consequently, parasite populations frequently exhibit marked seasonal fluctuations in freshwater ecosystems (Kennedy, 1975; Marcogliese, 2008).

Recent investigations from northern India have highlighted the ecological significance of helminth infections in freshwater fishes. Studies conducted on the Gomti River ecosystem reported considerable seasonal variation in gastrointestinal helminth communities and demonstrated the influence of environmental factors on parasite distribution (Kumar et al., 2026). Similarly, investigations on cestode populations in *Wallago attu* revealed pronounced seasonal dynamics associated with climatic conditions and host ecology (Reshu et al., 2024). Studies on the intensity of *Pallisentis* infection in *Channa punctata* from Uttar Pradesh further indicated that helminth parasites constitute an important component of the parasitic fauna of snakehead fishes (Kumar et al., 2023).

Muzaffarpur District of Bihar possesses numerous ponds, rivers, wetlands, and floodplain ecosystems that provide suitable habitats for freshwater fishes and their associated parasites. The environmental conditions prevailing in the region, particularly during the monsoon season, may facilitate the development and transmission of helminth parasites. Despite the economic importance of *Channa punctata* in local fisheries, information regarding the occurrence and seasonal variation of intestinal cestodes in this region remains scarce.

II. MATERIALS AND METHODS

2.1. Study Area

The study was conducted in Muzaffarpur District, Bihar, India. Fish samples were collected from ponds, rivers, wetlands, and local fish markets situated in different parts of the district. The region experiences a humid subtropical climate characterized by summer, monsoon, autumn, and winter seasons.

2.2. Collection of Fish Samples

A total of 240 specimens of *Channa punctata* were collected during the period January 2025 to December 2025. Freshly captured fish were transported to the laboratory for examination.

2.3. Examination of Fish

Each fish was measured for total length and body weight. The alimentary canal was carefully removed and dissected in physiological saline solution. The intestine was opened longitudinally and examined under a stereoscopic microscope.

2.4. Collection, Preservation and Identification of Parasites

Recovered cestodes were washed in normal saline and fixed in hot 4% formalin. Specimens were stained, dehydrated through ascending grades of alcohol, cleared in xylene, and mounted in Canada balsam for permanent preservation. Parasites were identified on the basis of morphological and morphometric characteristics using standard taxonomic keys and available literature.

2.6. Statistical Analysis

Prevalence was calculated according to:

$$\text{Prevalence (\%)} = \left(\frac{\text{Number of infected fish}}{\text{Number examined}} \right) \times 100$$

Chi-square analysis was applied to determine seasonal variation in infection prevalence and statistical significance was accepted at $p < 0.05$.

III. RESULTS

3.1. Overall Prevalence

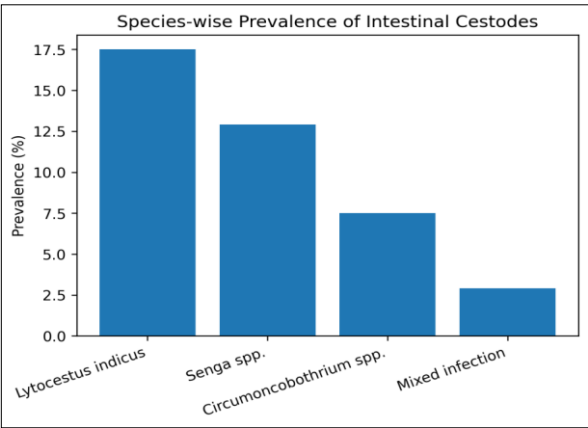
Out of 240 examined *Channa punctata*, 98 fish were infected with one or more species of intestinal cestodes, resulting in an overall prevalence of 40.83%.

3.2. Species-wise Prevalence

Three major cestode taxa were recorded from the intestine of *C. punctata*, namely *Lytocestus indicus*, *Senga* spp., and *Circumoncobothrium* spp. Among these, *L. indicus* was the most prevalent parasite, infecting 42 fish (17.50%), followed by *Senga* spp. (12.92%) and *Circumoncobothrium* spp. (7.50%). Mixed infections were observed in 7 fish (2.91%).

Table: 1. Species-wise prevalence of intestinal cestodes in *Channa punctata*

Parasite Species	No. Infected	Prevalence (%)
<i>Lytocestus indicus</i>	42	17.50
<i>Senga</i> spp.	31	12.92
<i>Circumoncobothrium</i> spp.	18	7.50
Mixed infection	7	2.91
Total	98	40.83



Graph:1. Species-wise prevalence of intestinal cestodes in *Channa punctata*

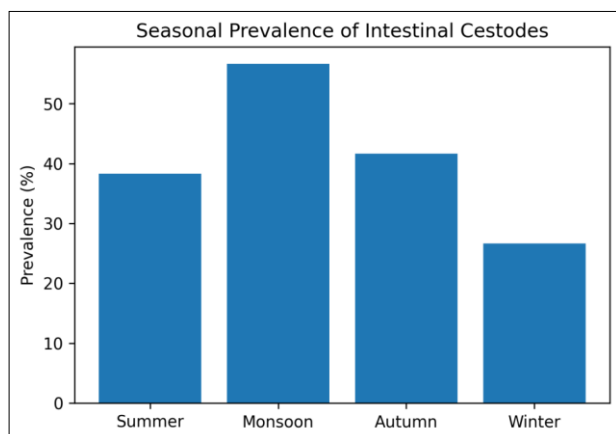
The dominance of *L. indicus* suggests its greater adaptation to the host environment and favorable ecological conditions for transmission.

3.3. Seasonal Variation

Seasonal analysis showed marked variation in infection rates. The highest prevalence was recorded during the monsoon season (56.67%), followed by autumn (41.67%), summer (38.33%), and winter (26.67%).

Table 2. Seasonal prevalence of intestinal cestodes

Season	Examined	Infected	Prevalence (%)
Summer	60	23	38.33
Monsoon	60	34	56.67
Autumn	60	25	41.67
Winter	60	16	26.67

**Graph: 2. Seasonal prevalence of intestinal cestodes**

Increased prevalence during monsoon may be attributed to favorable environmental conditions such as elevated water temperature, increased nutrient availability, and enhanced abundance of intermediate hosts, facilitating parasite transmission. Lower prevalence in winter may result from reduced metabolic activity of both parasites and hosts.

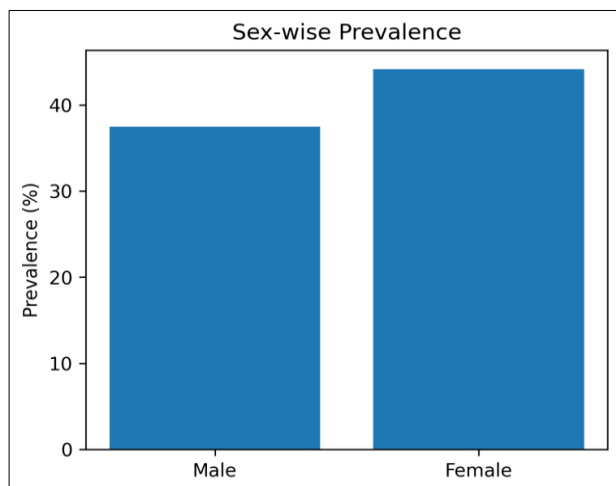
3.4. Sex-wise Prevalence

Female fish exhibited a slightly higher prevalence (44.17%) than male fish (37.50%).

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Table 3. Sex-wise prevalence of infection

Sex	Examined	Infected	Prevalence (%)
Male	120	45	37.50
Female	120	53	44.17

**Graph: 3. Sex-wise prevalence of infection**

The relatively higher infection rate in females may be associated with physiological stress during reproductive periods and hormonal influences affecting immune response.

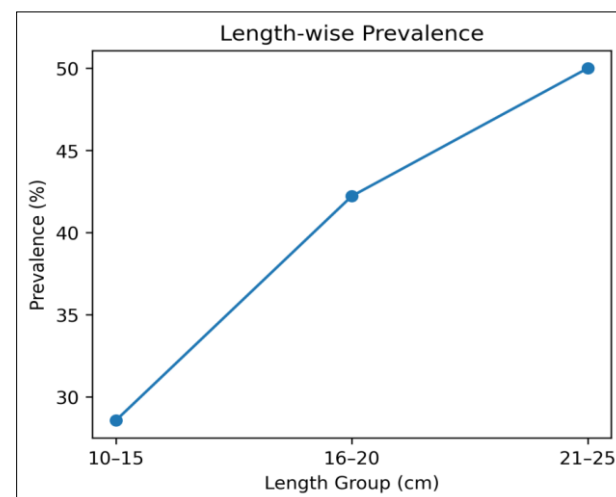
3.5. Length-wise Prevalence

Infection prevalence increased progressively with fish length. The highest prevalence (50.00%) was observed in fish measuring 21–25 cm, while the lowest prevalence (28.57%) occurred in fish measuring 10–15 cm.

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Table 4. Length-wise prevalence of infection

Length Group (cm)	Examined	Infected	Prevalence (%)
10–15	70	20	28.57
16–20	90	38	42.22
21–25	80	40	50.00

**Graph: 4. Length-wise prevalence of infection**

Larger fish exhibited higher infection rates, likely due to longer exposure time to infective stages and increased feeding activity, which enhances the chances of ingesting intermediate hosts carrying larval cestodes.

3.6. Statistical Analysis

The Chi-square test revealed significant differences in infection prevalence among seasons ($\chi^2 = 9.84$, $df = 3$, $p < 0.05$), indicating that seasonal factors significantly influence cestode infection in *Channa punctata*. The observed increase during the monsoon season suggests that environmental variables play a crucial role in parasite transmission dynamics.

No statistically significant difference was observed between male and female fish ($p > 0.05$), although females showed a slightly higher prevalence. Length-wise prevalence demonstrated a positive trend with increasing fish size.

IV. DISCUSSION

The present investigation revealed an overall prevalence of 40.83% intestinal cestode infection in *Channa punctata* from Muzaffarpur District, Bihar. The prevalence observed in the present study is comparable with reports from various freshwater ecosystems of India, where cestode infections constitute a major parasitic burden in economically important fishes. Similar observations have been reported in *Channa* species and other freshwater fishes, indicating that environmental conditions, host susceptibility, and availability of intermediate hosts significantly influence parasite prevalence (Chubb, 1982; Kennedy, 1994).

Among the recorded cestodes, *Lytocestus indicus* exhibited the highest prevalence (17.50%), followed by *Senga* spp. and *Circumoncobothrium* spp. (Table 1 & Graph 1). The predominance of *L. indicus* may be attributed to its successful adaptation to the intestinal environment of the host and efficient transmission through annelid intermediate hosts. Previous studies have similarly reported *Lytocestus* species as dominant cestode parasites in freshwater fishes due to their broad host range and favorable life-cycle characteristics (Scholz, 1999; Bhure et al., 2010).

Seasonal analysis demonstrated significant variation in infection rates, with the highest prevalence occurring during the monsoon season (56.67%) and the lowest during winter (26.67%) (Table 2 & Graph 2). The observed seasonal pattern is consistent with earlier studies that reported increased parasitic infections during rainy seasons. Monsoon conditions enhance water quality fluctuations, increase organic matter content, and favor the proliferation of intermediate hosts, thereby facilitating parasite transmission. Elevated temperature and humidity during monsoon also promote parasite development and survival in aquatic ecosystems (Marcogliese, 2001; Poulin, 2006). Reduced prevalence during winter may be associated with decreased feeding activity of fish and lower developmental rates of parasites.

Female fish showed a slightly higher prevalence (44.17%) than males (37.50%) (Table 3 & Graph 3). Although the difference was not statistically significant, similar trends have been documented in several fish species. Increased susceptibility in females may be related to physiological stress associated with gonadal maturation and spawning activities, which can temporarily suppress immune responses and increase vulnerability to parasitic infections (Dogiel, 1961; Roberts, 2012). Hormonal changes during reproduction may further influence host resistance to infection.

Length-wise analysis indicated a progressive increase in prevalence with increasing fish size. Fish measuring 21–25 cm exhibited the highest prevalence (50.00%), whereas smaller fish (10–15 cm) showed the lowest prevalence (28.57%) (Table 4 & Graph 4). This observation supports the widely accepted view that

larger and older fish accumulate parasites over time due to prolonged exposure to infective stages and increased consumption of infected prey organisms. Similar positive correlations between host size and parasite burden have been reported in numerous freshwater fish species (Kennedy, 1994; Poulin, 2007).

The chi-square analysis confirmed significant seasonal variation in cestode prevalence ($p < 0.05$), emphasizing the influence of environmental factors on parasite dynamics. Seasonal changes in temperature, rainfall, water quality, and intermediate host abundance are recognized as key determinants of parasite transmission in freshwater ecosystems (Marcogliese, 2001). These findings highlight the importance of continuous monitoring of parasitic infections in commercially important fishes to support effective fish health management and sustainable aquaculture practices.

V. CONCLUSION

The present study revealed a considerable prevalence (40.83%) of intestinal cestode infections in *Channa punctata* from Muzaffarpur District, Bihar, with *Lytocestus indicus* being the dominant species. Infection prevalence showed significant seasonal variation, reaching its peak during the monsoon season, and increased progressively with fish length. Although females exhibited a slightly higher prevalence than males, the difference was not statistically significant. These findings highlight the influence of environmental and host-related factors on cestode transmission and emphasize the need for regular monitoring of parasitic infections to support fish health management and sustainable freshwater fisheries in the region.

REFERENCES

- [1] Bhure D. B. et al. (2010). Studies on cestode parasites of freshwater fishes from India.
- [2] Chandra, K.J. (2006). *Fish Parasitology and Aquatic Health Management*. Daya Publishing House, New Delhi.
- [3] Dogiel V. A. (1961). Ecology of the parasites of freshwater fishes. In *Parasitology of Fishes*.
- [4] Dogiel, V.A. (1961). Ecology of the parasites of freshwater fishes. In: *Parasitology of Fishes*. Oliver and Boyd, Edinburgh.
- [5] Jhingran, V.G. (1991). *Fish and Fisheries of India*. Hindustan Publishing Corporation, New Delhi.
- [6] Kennedy C. R. (1994). *The Ecology of Freshwater Fish Parasites*. Academic Press.
- [7] Kennedy, C.R. (1975). *Ecological Animal Parasitology*. Blackwell Scientific Publications, Oxford.
- [8] Kumar, P., Jaiswal, N., Singh, A. and Mishra, S. (2026). Ecology and seasonal dynamics of

- gastrointestinal helminths in freshwater fish from the Gomti River and wetlands. *Aquatic Ecology*, 60, 1–30.
- [9] Kumar, P., Malviya, S.J., Gupta, A.K., Yadav, D., Reshu and Jaiswal, N. (2023). Studies on the intensity of *Pallisentis* infecting snakeheads, *Channa punctatus* of Sultanpur District, Uttar Pradesh. *Experimental Zoology India*, 26(2), 1373–1380.
- [10] Marcogliese D. J. (2001). Implications of climate change for parasitism of animals in aquatic environments. *Canadian Journal of Zoology*, 79, 1331–1352.
- [11] Marcogliese, D.J. (2001). Implications of climate change for parasitism of animals in aquatic environments. *Canadian Journal of Zoology*, 79, 1331–1352.
- [12] Marcogliese, D.J. (2008). The impact of climate change on the parasites and infectious diseases of aquatic animals. *Revue Scientifique et Technique*, 27, 467–484.
- [13] Pietrock, M. and Marcogliese, D.J. (2003). Free-living endohelminth stages: at the mercy of environmental conditions. *Trends in Parasitology*, 19, 293–299.
- [14] Poulin R. (2006). Global warming and temperature-mediated increases in cercarial emergence. *Journal of Helminthology*, 80, 265–273.
- [15] Poulin R. (2007). *Evolutionary Ecology of Parasites* (2nd Edition). Princeton University Press.
- [16] Reshu, K., Kumar, P. and Jaiswal, N. (2024). Population dynamics of cestode parasite, *Gangesia* sp. in *Wallago attu* of Gomti River, Lucknow, Uttar Pradesh, India. *African Journal of Biomedical Research*, 27(1), 2622–2628.
- [17] Roberts R. J. (2012). *Fish Pathology* (4th Edition). Wiley-Blackwell.
- [18] Roberts, L.S. and Janovy, J. (2009). *Foundations of Parasitology*. 8th Edition. McGraw-Hill, New York.
- [19] Scholz T. (1999). Parasites in freshwater fishes of Central Europe. *Academia Prague*.
- [20] Talwar, P.K. and Jhingran, A.G. (1991). *Inland Fishes of India and Adjacent Countries*. Oxford & IBH Publishing Co., New Delhi. Chubb J. C. (1982). Seasonal occurrence of helminths in freshwater fishes. *Advances in Parasitology*, 20, 1–292.