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# HISTOPATHOLOGICAL CHANGES IN FRESHWATER FISH *CHANNA STRIATUS* INFECTED WITH NEMATODE FROM KAIGAON TOKA (M.S.) INDIA

**Vitthal Kharat and Deepak Gaikwad***

*Departent of Zoology,*

*Rajarshi Shahu Arts, Commerce and Science College Pathri, Chh. Sambhajinagar*

**Corresponding author E-mail: dr.dmgaikwad@gmail.com*

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**Abstract:**

*This study investigates the histopathological impacts of nematode parasite infestation on the freshwater fish Channa striatus collected from the Godavari River at Kaigaon Toka, Maharashtra, India. Channa striatus, a commercially vital species, serves as an intermediate or definitive host for various nematodes, which causes significant physiological stress. Among these, nematodes of the genus Eustrongylides are known to cause significant tissue damage. This study was conducted to evaluate the histopathological impact of nematode infection on the visceral organs, primarily the liver and intestine, of Channa striatus. Histopathological analysis revealed severe structural changes in the infected organs. In the intestine, there was a marked destruction of the mucosal epithelium, shortening of the villi, and infiltration of inflammatory cells in the submucosa. These pathological changes likely interfere with the metabolic and digestive functions of the host, potentially reducing its growth, immunity, and overall market value.*

**Keywords:** *Channa striatus, Histopathology, Eustrongylides.*

## Introduction

*Channa striatus*, commonly known as the striped snakehead or murrel, is a commercially vital freshwater fish belonging to the family *Channidae*. Indigenous to South and Southeast Asia, it is highly valued for its firm flesh and reputed medicinal properties; specifically, it is rich in arachidonic acid and amino acids like glycine, which are known to accelerate wound healing and post-operative recovery (1). This species is characterized by an elongated, cylindrical body and a "snake-like" head covered with large scales. A defining biological feature of *C. striatus* is its accessory respiratory organ, which allows it to breathe atmospheric air and survive in harsh, oxygen-depleted environments such as stagnant ponds and rice paddies (2). Due to its air-breathing capability, it is a hardy species suitable for intensive aquaculture, though successful large-scale breeding often requires induced spawning techniques (3). As a top-tier carnivorous predator, its diet consists of smaller fish, crustaceans, and insects, a

feeding habit that makes it a frequent host for various helminth parasites. In the riverine ecosystems of Maharashtra, particularly the Godavari basin near Kaigaon Toka, these fish are often found to be infected with nematodes, which cause significant histopathological damage to their internal organs (4).

In the context of parasitology, *Channa striatus* is frequently used as a biological model to study the impact of helminthiasis on wild fish populations. Furthermore, the seasonal prevalence of these infections is often linked to environmental factors such as water temperature and monsoon cycles, which influence both the availability of intermediate hosts and the immunity of the fish (5). Understanding these ecological and physiological dynamics is essential for maintaining the health of inland fisheries, where *Channa striatus* remains a commercially significant food source.

The parasitic fauna of *Channa striatus* (striped snakehead) is exceptionally diverse, reflecting the fish's role as a top-tier carnivorous predator and its preference for benthic, often stagnant, freshwater habitats. These environments facilitate the completion of complex life cycles for various helminths, where the fish serves as either an intermediate, paratenic, or definitive host. The parasitic assemblage commonly includes nematodes (roundworms), cestodes (tapeworms), acanthocephalans (thorny-headed worms), and trematodes (flukes). Among these, the nematode genus *Contracaecum* and the acanthocephalan *Pallisentis ophiocephali* are frequently reported, often causing significant mechanical damage to the intestinal mucosa and liver tissues (4). Research in the Maharashtra region, including the Godavari and Penganga river basins, has highlighted that the prevalence and intensity of these infections are strongly influenced by seasonal fluctuations, with peak infestations often occurring during the summer when water levels recede and intermediate host density increases. Furthermore, specific endoparasites like *Gnathostoma spinigerum* and *Camallanus* species are of particular concern due to their zoonotic potential and their ability to cause systemic physiological stress, leading to necrosis and inflammatory responses in the host (1).

Understanding the pathological relationship between nematodes and *Channa striatus* is crucial, as these infections can impair nutrient absorption and suppress the host's immune system. The present investigation is done by studying the histopathology of freshwater fish *Channa striatus* from Kaigaon Toka infected with nematode *Eustrongylides*.

**Material and Methods**

The investigation was situated at Kaigaon Toka (19° 37′ 38″ N, 75° 01′ 46″ E), a geographically significant site in the Gangapur Tehsil of the Chhatrapati Sambhajinagar district, Maharashtra. This location serves as the confluence point for the Godavari and Pravara rivers, creating a distinct ecological habitat. The region's tropical semi-arid climate, marked by clear seasonal shifts, plays a critical role in regulating riverine flow and the biological cycles of endemic aquatic parasites.

During the 2022–2023 study period, specimens of the striped snakehead (*Channa striatus*) were procured from the riverbanks with the support of local fishing communities. Harvesting was performed using traditional cast and gill nets. To ensure the viability of the samples and the integrity of the parasitic fauna, the fish were immediately transferred into plastic vessels containing native river water and moved to the laboratory for detailed parasitological analysis.

**Parasitological examination**

In the laboratory, the fish were pithed and measured for total length and weight. The body cavity was opened via a longitudinal incision to expose the visceral organs. The gastrointestinal tract, liver, and stomach were removed

and placed in separate Petri dishes containing 0.7% physiological saline solution. These organs were carefully examined under a stereomicroscope to detect the presence of nematodes.

**Parasite fixation and identification**

Recovered nematodes were gently detached from the host tissue using fine needles. They were washed in saline, fixed in 4% formalin or hot 70% alcohol, and cleared in lactophenol for morphological study. Identification was carried out using standard keys provided by Yamaguti (6) and other relevant taxonomical literature.

**Histopathological techniques**

For the histopathological study, small pieces (approx. 6 mm) of infected tissues (intestine, liver, or stomach) were excised along with the attached or encysted parasites. Fixation: Tissues were fixed in Bouin's fluid for 24 hours to preserve cellular architecture. Processing: The fixed samples were washed in running tap water, dehydrated through a graded series of alcohol (30% to 100%), and cleared in xylene. Embedding: Tissues were embedded in paraffin wax (melting point 58–60°C) to form blocks. Sectioning: Thin sections of 6–8 µm thickness were cut using a rotary microtome.

**Staining**

The sections were stained using the Haematoxylin and Eosin (H&E) double-staining technique. The best slides were selected, observed under a light microscope, and photomicrographs were captured to document tissue alterations such as necrosis, inflammatory infiltration, and mucosal damage.

**Result and Discussion**

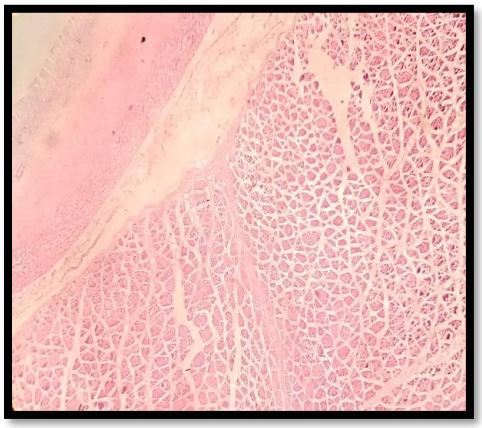

**Figure 1: Normal Intestinal tissue of *Channa striatus***

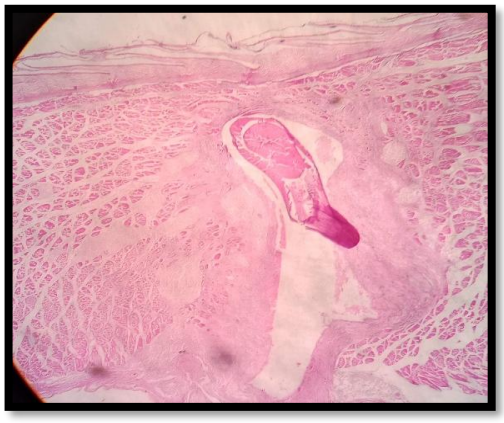

**Figure 2: Infected Intestinal tissue of *Channa striatus***

The histopathological examination of *Channa striatus* specimens from Kaigaon Toka revealed significant structural alterations in the gastrointestinal tract and associated organs due to *Eustrongylides* nematode infestation. In the intestine, the most prominent changes included the severe erosion of the mucosal epithelium and the shortening or fusion of intestinal villi, which significantly reduces the surface area available for nutrient absorption. There was marked necrosis in the submucosal layers, accompanied by an intense infiltration of inflammatory cells, such as lymphocytes and eosinophils, at the sites where the nematodes had physically anchored themselves.

At the Kaigaon Toka site, the confluence of the Godavari and Pravara rivers provides a unique ecological niche where the abundance of intermediate hosts, such as copepods, likely drives the high prevalence of infection. The seasonal peak observed during the summer months aligns with the research of Wankhede (5), who noted that higher water temperatures in the Marathwada region accelerate the life cycles of both the parasites and their

vectors. This increased "parasitic load" during the summer leads to the systemic pathology observed in the liver, including the rupture of hepatic sinusoids and focal necrosis. Such hepatic damage is particularly detrimental, as the liver is the primary organ for detoxification and metabolic regulation in fish (7). Furthermore, the formation of fibrous capsules around encysted larvae suggests a host-parasite "evolutionary tug-of-war." While the fish attempts to sequester the parasite to prevent further organ penetration, the presence of these cysts alone can cause pressure atrophy in adjacent healthy tissues. These results are in agreement with Pawar (8), who suggested that chronic helminth infections in *Channa striatus* are a significant factor in the decline of fish health and marketability in the Godavari river basin. Ultimately, the cumulative histopathological alterations observed at Kaigaon Toka indicate that nematode parasites are not merely "passengers" but active pathogens that significantly threaten the ecological fitness of *Channa striatus*.

**References**

1. Mat Jais, A. M., Fowler, D. R., & Williams, D. B. (1997). Fatty acid and amino acid composition in Haruan, *Channa striatus*, for wound healing. *General Pharmacology: The Vascular System*, 29(3), 399–405.
2. Talwar, P. K., & Jhingran, A. G. (1991). *Inland fishes of India and adjacent countries* (Vols. 1–2). Oxford & IBH Publishing Co. Pvt. Ltd.
3. Haniffa, M. A., & Marimuthu, K. (2004). Induced spawning of the striped snakehead *Channa striatus* using pituitary extract and human chorionic gonadotropin. *Aquaculture Research*, 35(15), 1445–1448.
4. Chaudhary, A., Singh, H. S., & Hasnain, M. (2014). Prevalence of nematode infection in freshwater fishes of the Godavari River. *Journal of Parasitic Diseases*, 38(2), 265–271.
5. Wankhede, H. J. (2004). Studies on some nematode parasites of freshwater fishes from Aurangabad region. *Journal of Science Research*, 2(1), 88–92.
6. Yamaguti, S. (1961). *Systema helminthum: The nematodes of vertebrates* (Vol. 3, Parts I and II). Interscience Publishers.
7. Kadam, K. N. (2011). Histopathological study of the liver of *Channa striatus* infected by nematode parasite *Spinitectus*. *Journal of Experimental Sciences*, 2(6), 11–13.
8. Pawar, S. B. (2011). *Taxonomic studies of some nematode parasites from freshwater fishes of Maharashtra state, India* (Doctoral dissertation, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India).
9. Dhole, J., Jawale, S., Waghmare, S., & Chavan, R. (2010). Prevalence of helminth parasites in freshwater fishes from Marathwada region, Maharashtra. *Journal of Parasitic Diseases*, 34(1), 25–30.
10. Hiware, C. J. (2015). Pathological effects of helminth parasites on the liver of *Channa striatus*. *International Journal of Recent Trends in Science and Technology*, 15(2), 312–315.
11. Malsawmtluangi, C., & Lalramliana. (2016). Prevalence of helminth parasites infecting *Channa striatus* from different rivers of Mizoram. *Science Vision*, 16(3), 144–150.
12. Padwi, S. S. (2024). Histopathological study of *Channa striatus* infected with cestode parasite from Buldana district. *International Research Journal of Science and Engineering*, 12(1), 45–48.
13. Wankhede, H., & Reddy, Y. (2009). On a new species of the genus *Senga* (Dollfus, 1934) (Cestode: Ptycobothridae, Luhe, 1902) from freshwater fish *Channa striatus* at Kaigaon Toka. *Environment Conservation Journal*, 10(3), 63–66. https://doi.org/10.36953/ECJ.2009.100312