OCCURENCE OF HELMINTH PARASITES IN FRESHWATER FISH *MASTACEMBELUS ARMATUS* FROM KHANDALA DAM, WASHIM DISTRICT, MAHARASHTRA, INDIA

A.A. Udgire
Department of Zoology, R. A. Arts, Shri M. K. Commerce and Shri S. R. Rathi Science College, Washim
abhimanyudgire51@gmail.com

V.G. Khadse
Department of Zoology, Balbhim Arts, Science and Commerce Collge, Beed. Dist. Beed
vishalkhadse619@gmail.com

Abstract
Helminth parasites are common infective agents in freshwater fishes, impacting fish health, reproduction, and aquaculture productivity. This study investigates the prevalence, diversity, and intensity of helminth parasites infecting Mastacembelus armatus (spiny eel) collected from Khandala Dam in Washim District, Maharashtra, India. The research evaluates parasite taxa including nematodes and cestodes. their prevalence rates, and potential implications for fisheries management and public health.
Keyword: *Mastacembelus armatus, helminth parasites, prevalence, freshwater fish, Khandala Dam, Maharashtra, nematodes, cestodes.*

Introduction

Mastacembelus armatus, commonly known as the zig-zag eel or freshwater spiny eel, is a widely distributed freshwater fish species belonging to the family Mastacembelidae, occurring across India, Bangladesh, Nepal, Pakistan, Myanmar, Thailand, and other parts of South and Southeast Asia (**Alam et al., 2020; Rahman, 2005; Froese & Pauly, 2023**). It inhabits rivers, streams, reservoirs, and floodplains, usually preferring sandy or muddy bottoms where it can burrow and forage (**Talwar & Jhingran, 1991**). As an intermediate predator, *M. armatus* feeds on aquatic insects, crustaceans, mollusks, fish larvae, and other benthic organisms, thereby contributing to energy transfer and trophic dynamics in freshwater ecosystems (**Alam et al., 2020; Sarkar et al., 2012**).

Economically, *M. armatus* is highly valued in local and regional fisheries for its size, flavor, and market demand. It is consumed fresh and occasionally used in traditional medicine, making it an important species for livelihood security in rural communities (**Rahman, 2005; Datta & Banerjee, 2014; FAO, 2022**). In addition to capture fisheries, the species has potential for aquaculture diversification due to its hardy nature and consumer acceptance (**Khan et al., 2017**).

Despite its ecological and economic significance, *M. armatus* populations are under increasing pressure from anthropogenic activities such as overexploitation, destructive fishing methods, habitat alteration, dam construction, and pollution. These factors, combined with climate change, pose serious threats to freshwater biodiversity in India and elsewhere (**Sarkar et al., 2012; Dudgeon et al., 2006**). In addition, biological stressors such as parasitic infections are major concerns in both wild and cultured populations. Helminths including nematodes, cestodes, and trematodes frequently infect *M. armatus*, impairing growth, reproduction, and survival, and ultimately reducing fishery productivity (**Malsawmtluangi & Lalramliana, 2016; Dhole et al., 2010**). Some helminths are also zoonotic, raising food safety and public health risks when undercooked or raw fish is consumed (**Chai et al., 2005; Dhole et al., 2010**).

Several studies across India have reported diverse helminth fauna in *M. armatus*, with nematodes being the most dominant parasite group (**Malsawmtluangi & Lalramliana, 2016; Dhole et al., 2010; Banu et al., 2015**). However, while the species is widely distributed in Maharashtra, comprehensive data on parasite prevalence, intensity, and diversity from this region remain scarce. Particularly, no systematic studies have been conducted on the helminth parasitic community of *M. armatus* from Khandala Dam, Washim District, Maharashtra.

Materials and Methods

Study Area: Khandala Dam, located in Washim District of Maharashtra, was selected for fish sampling based on its ecological significance and diverse fish fauna. The dam is an important freshwater reservoir supporting various aquatic species, including Mastacembelus armatus, which thrives in its habitat due to favourable water quality and availability of prey. Washim District is in the Vidarbha region of Maharashtra, characterized by a tropical climate with distinct seasonal variations influencing aquatic biodiversity and ecosystem dynamics.

Khandala Dam serves multiple purposes, including irrigation, drinking water supply, and supporting local livelihoods through fishing activities. The

reservoir is part of a network of dams in the Washim region that collectively contribute to the socio-economic well-being of local communities by providing water for agriculture and household use. However, the dam and its associated water bodies face environmental pressures from anthropogenic activities such as agriculture runoff, domestic waste discharge, and irrigation practices, which may affect water quality and aquatic life health.

The ecological health of Khandala Dam is critical as it forms habitat for commercially important fish species, supports fisheries sustainability, and plays a role in regional biodiversity conservation. Seasonal changes in water parameters, habitat conditions, and human interference influence parasite prevalence in freshwater fishes. Therefore, studying Mastacembelus armatus in this dam provides valuable insight into the parasite-host dynamics under regional environmental conditions, helping design effective conservation and fishery management strategies for sustainable use of this freshwater resource.

Sampling: Freshwater fish Mastacembelus armatus was collected monthly from local fishermen and designated sampling points across Khandala Dam over a 12-month period to capture seasonal variation in helminth parasite prevalence. Sampling was conducted during early morning hours to ensure the fish were freshly caught and to minimize the effects of differential digestion on parasite detection.

A sample size of approximately 20-30 specimens per month was targeted to provide statistically meaningful data. Fish were collected using standard local fishing techniques including gill nets and traps commonly used by fishermen in the region. Upon capture, each specimen was measured for total length and weight, sexed by gonadal inspection, and immediately transported to the laboratory in insulated containers with ice to preserve sample integrity.

In the laboratory, fish were examined fresh or preserved in 10% formalin for detailed parasitological studies. Fish dissection involved a systematic examination of the gastrointestinal tract, liver, and body surface for helminth parasites. The parasites were isolated, counted, and identified using standard taxonomic keys under a stereo microscope.

This rigorous and standardized monthly sampling regime across different seasons helped assess the temporal dynamics of helminth infections and correlate parasite load with environmental and biological factors affecting Mastacembelus armatus in Khandala Dam.

Result:

Parasitological Examination: Fish were dissected and examined for helminth parasites in the gastrointestinal tracts, liver, and body surfaces using established parasitological techniques. External examination included inspection of skin, fins, gills, and body cavity for ectoparasites and encysted larval stages. Internal organs were carefully dissected, and the gastrointestinal tract was opened longitudinally to recover endoparasites.

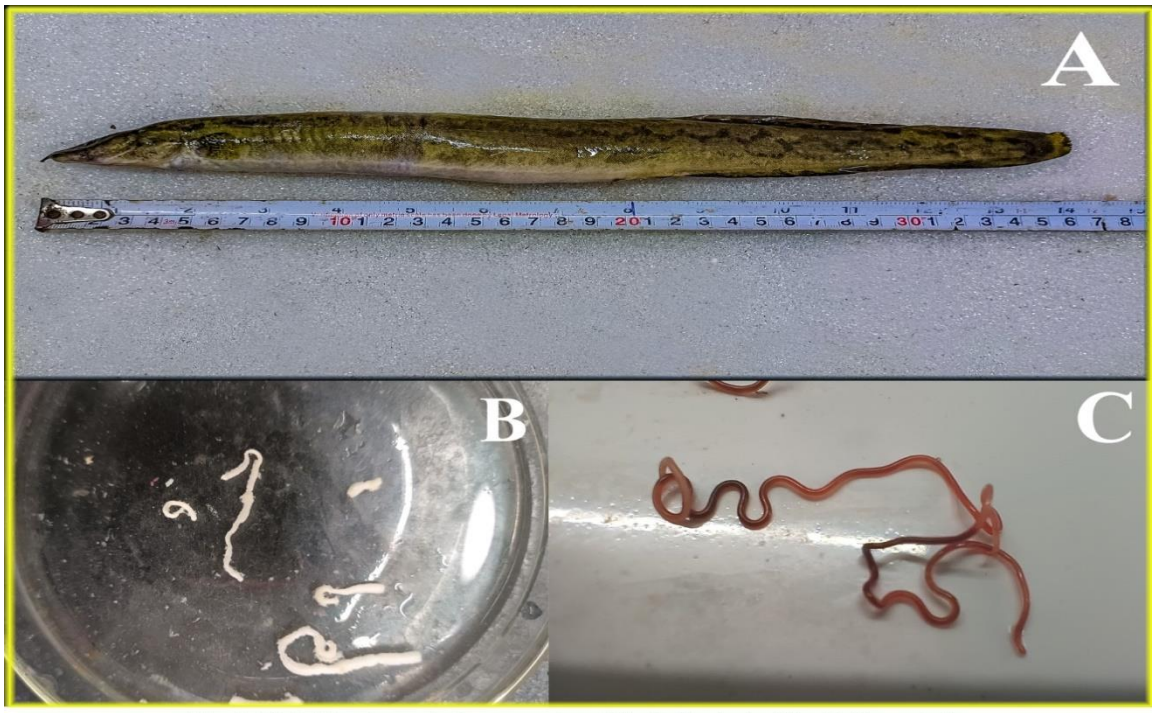

Fig.A-Fish Mastacembelus armatus, Fig.B-Cestode, Fig.C-Nematode

Recovered parasites were washed in saline solution to remove debris and then fixed for identification. Nematodes were stretched and fixed in warm 70% alcohol, cleared in ascending grades of glycerine, and mounted using Kaiser's glycerine jelly for permanent slides. Cestodes were flattened gently, stained with Borax carmine or Meyer's carmalum, dehydrated in alcohol series, cleared in methyl benzoate, and mounted in Canada balsam.

Morphological identification was conducted under a stereo microscope and compound light microscope based on standard taxonomic keys. Specimens were identified to genus or species level where feasible, concentrating on nematodes (e.g., Capillaria sp., Spinitectus sp.), cestodes (e.g., Senga sp., Bothriocephalus sp.). Temporary mounts in lactophenol were used for preliminary observations.

Histopathological examinations were performed on parasitized tissues fixed in Bouin's fluid or formalin, embedded in paraffin, sectioned at 5–8 µm, and stained with hematoxylin and eosin to assess tissue damage caused by parasite infection.

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