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Research Article

Occurrence and Diversity of Helminth Parasites in Freshwater Edible Fishes of Nanded, Maharashtra, India

N. B. Gavhane [1], D.B. Bhure [2], S.S. Nanware [3*]

[1-3] Department of Zoology, Yeshwant Mahavidyalaya, Nanded, Maharashtra, India

Corresponding Author: * S.S. Nanware

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Abstract

Freshwater fishes support diverse helminth communities whose occurrence is influenced by host biology, feeding behaviour and environmental conditions. The present study investigated the occurrence and taxonomic diversity of helminth parasites associated with two edible freshwater fishes, *Channa* sp. and *Wallago attu*, from Nanded District, Maharashtra, India. Sampling was conducted over twelve consecutive months, from February 2024 to January 2025. A total of 110 fish specimens were examined, from which 138 individual helminth parasites were recovered. The recorded parasites belonged to three major groups, namely Cestoda, Trematoda and Nematoda. The cestodes comprised *Senga* sp. from *Channa* sp. and *Gangesia* sp. from *Wallago attu*. The trematodes included *Azygia* sp. from *Channa* sp. and *Isoparorchis* sp. from *Wallago attu*. The nematodes recorded were *Camallanus* sp. and *Procamallanus* sp., associated with the examined *Channa* sp. and *Wallago attu*. The overall mean parasite burden was 1.25 parasites per examined fish. The findings provide baseline information on the helminth fauna associated with edible freshwater fishes in the Nanded region. Because host-specific infection data and parasite-wise counts were not available for the present dataset, prevalence, mean intensity, abundance and formal diversity indices were not estimated. Further investigations incorporating quantitative epidemiological data, seasonal sampling and molecular characterization are warranted to clarify the distribution and taxonomic status of the recorded helminths.

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1. INTRODUCTION

Freshwater fishes constitute an important component of aquatic ecosystems and are an important source of food and livelihood. Their health and productivity may be influenced by a range of biological and environmental factors, including parasitic infections. Helminths, particularly cestodes, trematodes and nematodes, are frequently encountered in freshwater fishes and may affect host condition, nutrient utilization and physiological performance.

The occurrence and distribution of fish helminths are influenced by several factors, including host species, feeding habits, habitat, age and size of the host, seasonality and the availability of intermediate or transport hosts. Consequently, parasite assemblages may vary among fish species and among geographically separated freshwater ecosystems.

Maharashtra supports a diverse freshwater fish fauna and has been the subject of numerous investigations concerning fish parasites. Helminth parasites belonging to Cestoda, Trematoda and Nematoda have been reported from several freshwater fishes of the state. Among the cestodes, members of the genus *Senga* are associated with snakeheads of the genus *Channa*, whereas *Gangesia* has been recorded from siluriform fishes, including *Wallago attu*.

Taxonomic reassessment has demonstrated that some groups of Indian freshwater fish cestodes contain considerable historical synonymy. In particular, morphological and molecular revision of *Gangesia* resulted in the recognition that several previously described species were not taxonomically distinct. Such findings emphasize the importance of cautious species-level identification when molecular confirmation or comprehensive morphological evidence is unavailable.

Channa spp. and *Wallago attu* are important freshwater fishes and are known to harbour a variety of helminth parasites. Although fish parasitological investigations have been conducted in different parts of Maharashtra, information concerning the contemporary helminth fauna of edible fishes from Nanded remains comparatively limited.

The present study was therefore undertaken to document the occurrence and taxonomic diversity of helminth parasites associated with *Channa* sp. and *Wallago attu* collected from local freshwater systems of Nanded District during February 2024–January 2025.

2. MATERIALS AND METHODS

Study area and sampling period

The investigation was conducted in Nanded District, Maharashtra, India, located in the Marathwada region. Sampling was undertaken over twelve consecutive months, from February 2024 to January 2025. Edible freshwater fishes available from selected local fish-bearing freshwater systems were examined for helminth infections.

Collection and examination of fishes

A total of 110 fish specimens belonging to *Channa* sp. and *Wallago attu* were examined during the study period. Fish specimens were collected from local freshwater sources and transported to the laboratory for parasitological examination.

Each fish was examined externally and internally for helminth parasites. The body surface, body cavity, alimentary tract and associated visceral organs were examined under a stereomicroscope. The gastrointestinal tract and internal organs were carefully dissected and inspected for endoparasitic helminths.

Recovered parasites were removed using fine needles and forceps and preserved for further processing. Cestodes and trematodes were processed using conventional fixation, staining, dehydration, clearing and mounting procedures. Nematodes were washed, fixed and cleared before microscopic examination.

Parasites were identified on the basis of observable morphological characters and comparison with relevant taxonomic literature. In view of the limitations of the available material and the absence of molecular confirmation, identification was generally restricted to the genus level. Voucher specimens should preferably be deposited in an institutional parasitological collection where available.

Host–parasite associations

The helminth taxa recorded from the examined fish hosts are presented in Table 1.

Table 1. Host–parasite associations recorded during the study

Fish host	Helminth group	Parasite taxon
Channa sp.	Cestoda	*Senga* sp.
Channa sp.	Trematoda	*Azygia* sp.
Channa sp.	Nematoda	*Camallanus* sp.; *Procamallanus* sp.
Wallago attu	Cestoda	*Gangesia* sp.
Wallago attu	Trematoda	*Isoparorchis* sp.
Wallago attu	Nematoda	*Camallanus* sp.; *Procamallanus* sp.

Data analysis

The overall mean parasite burden was calculated as:

Mean parasite burden = Total number of parasites recovered / Total number of fish examined

= 138 / 110 = 1.25 parasites per fish

Thus, an average of 1.25 individual parasites was recovered per examined fish.

Species-specific prevalence, mean intensity and mean abundance were not calculated because the available dataset did not include the number of infected fish and parasite counts for each host and parasite taxon. Similarly, formal community diversity indices such as Shannon–Wiener diversity, Simpson's index and Pielou's evenness were not calculated because parasite-wise abundance data were unavailable.

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3. RESULTS

Overall helminth fauna

During the twelve-month investigation, 110 freshwater fish specimens representing *Channa* sp. and *Wallago attu* were examined. A total of 138 individual helminth parasites were recovered. The parasites represented three major helminth groups: Cestoda, Trematoda and Nematoda.

Six parasite taxa, identified to genus level, were recorded during the investigation: *Senga* sp., *Gangesia* sp., *Azygia* sp., *Isoparorchis* sp., *Camallanus* sp. and *Procamallanus* sp.

Cestodes

Two cestode genera were recorded. *Senga* sp. was associated with *Channa* sp., whereas *Gangesia* sp. was recovered from *Wallago attu*.

The occurrence of *Senga* in *Channa* is consistent with published records of *Senga* species from snakehead fishes in India. Molecular studies have also confirmed the association of *Senga* with *Channa* hosts.

Gangesia is a recognized cestode genus of freshwater siluriform fishes. Its occurrence in *Wallago attu* is consistent with previous investigations of proteocephalidean cestodes from Indian freshwater catfishes. Because the taxonomy of *Gangesia* has undergone substantial revision, the present material is conservatively reported as *Gangesia* sp.

Trematodes

Two trematode genera were recorded. *Azygia* sp. was recorded from *Channa* sp., whereas *Isoparorchis* sp. was recovered from *Wallago attu*.

The occurrence of *Azygia* in *Channa* is consistent with previous reports of *Azygia* species from freshwater snakeheads. Likewise, the association between *Isoparorchis* and *Wallago attu* has been documented in Indian freshwater fish.

Nematodes

The nematode fauna consisted of *Camallanus* sp. and *Procamallanus* sp. Both taxa were recorded in association with the examined freshwater fish hosts.

Members of these genera are commonly encountered among the nematode parasites of freshwater fishes. Their transmission may involve intermediate or transport hosts, and their distribution may therefore be influenced by fish feeding behaviour and environmental conditions.

Overall parasite burden

The recovery of 138 individual parasites from 110 examined fish resulted in an overall mean parasite burden of 1.25 parasites per fish.

This value represents the overall recovery across the complete sample and should not be interpreted as the mean intensity of infection, because the number of infected fish was not available.

4. DISCUSSION

The present investigation provides an inventory of helminth parasites associated with two edible freshwater fishes, *Channa* sp. and *Wallago attu*, from Nanded District, Maharashtra. The recorded fauna comprised representatives of Cestoda, Trematoda and Nematoda, indicating that both fish hosts support a varied assemblage of endoparasitic helminths.

The recovery of *Senga* sp. from *Channa* sp. agrees with the known association of this cestode genus with snakehead fishes. Molecular work on Indian fish cestodes has confirmed *Senga* species from *Channa* hosts, providing independent support for this host–parasite relationship. The present record therefore contributes additional locality-based information on the occurrence of *Senga* in freshwater fishes of Maharashtra.

The finding of *Gangesia* sp. in *Wallago attu* is similarly consistent with the established occurrence of proteocephalidean cestodes in freshwater siluriform fishes. However, taxonomic interpretation of *Gangesia* requires particular caution. A comprehensive revision incorporating morphology, molecular data and ultrastructural characters demonstrated considerable synonymy among species previously assigned to this genus. Accordingly, assignment of the present specimens to a particular *Gangesia* species would require diagnostic evidence that is not currently available.

The trematode *Azygia* sp. recorded from *Channa* sp. is also consistent with previous reports of *Azygia* from freshwater snakeheads. Members of the genus have been reported from Indian freshwater fishes, including *Channa* hosts. The occurrence of *Isoparorchis* sp. in *Wallago attu* likewise agrees with previous records of *Isoparorchis* from this catfish.

The presence of *Camallanus* sp. and *Procamallanus* sp. further demonstrates the representation of nematode parasites in the examined fish community. These nematodes have been reported from a variety of freshwater fishes, and their transmission can be influenced by trophic interactions involving intermediate or transport hosts. Differences in feeding behaviour between fish species may therefore contribute to differences in exposure to infective stages.

Nevertheless, the present study does not provide sufficient quantitative information to determine whether any individual parasite genus was more abundant or prevalent than another. The overall mean parasite burden of 1.25 parasites per examined fish was calculated from the total number of parasites recovered and all fish examined. It should therefore be distinguished from mean intensity, which is calculated using only infected hosts.

The absence of host-specific prevalence and parasite abundance data represents a limitation of the present investigation. For a more detailed epidemiological assessment, future studies should record the number of fish examined, the number infected, the number of parasites recovered from each host, infection site, host sex, body length and weight, and sampling season. These data would permit calculation of prevalence, mean intensity and mean abundance and would allow statistical comparison between host species and seasons.

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The ecological occurrence of fish helminths is influenced by multiple interacting factors. Host feeding habits may determine exposure to infective stages, while environmental conditions and the abundance of intermediate or transport hosts can affect parasite transmission. Seasonal changes may further modify these relationships. Consequently, the presence of a particular parasite in the present material should not by itself be interpreted as evidence of a specific ecological mechanism.

Taxonomic resolution is another important consideration. Morphological identification to genus level provides useful information for a preliminary faunal survey, but species-level determination can be difficult in groups containing morphologically similar taxa or extensive historical synonymy. The taxonomic history of *Gangesia* illustrates this problem particularly well. Future investigations combining detailed morphometric analysis with molecular markers would provide stronger evidence for species delimitation and host association.

Overall, the present findings expand the available information on helminth parasites of edible freshwater fishes from Nanded. The study establishes a preliminary taxonomic framework that can be used for subsequent investigations involving seasonal dynamics, host specificity, parasite population structure and molecular characterization.

5. CONCLUSION

The present study records a diverse assemblage of helminth parasites associated with two edible freshwater fishes, *Channa* sp. and *Wallago attu*, from Nanded District, Maharashtra. Examination of 110 fish specimens resulted in the recovery of 138 individual helminth parasites representing three major groups: Cestoda, Trematoda and Nematoda.

The recorded host–parasite associations included *Senga* sp. from *Channa* sp. and *Gangesia* sp. from *Wallago attu* among the cestodes; *Azygia* sp. from *Channa* sp. and *Isoparorchis* sp. from *Wallago attu* among the trematodes; and *Camallanus* sp. and *Procamallanus* sp. among the recorded nematodes.

The overall mean parasite burden was 1.25 parasites per examined fish. Because host-specific infection data were unavailable, no conclusions were drawn regarding prevalence, mean intensity, abundance or numerical dominance of individual parasite taxa.

The study provides baseline information on the helminth fauna of edible freshwater fishes in the Nanded region and establishes a foundation for more detailed parasitological investigations. Future studies should incorporate larger sample sizes, host-specific quantitative data, seasonal sampling, detailed morphometric analysis, voucher specimens and molecular characterization to improve understanding of parasite diversity, distribution and host associations.

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About the Corresponding Author



S.S. Nanware is a zoologist and academic researcher in the Department of Zoology at Yeshwant Mahavidyalaya, Nanded, Maharashtra, India. His academic interests focus on zoology, parasitology, helminth diversity, and fish parasites. He is actively involved in teaching, research, scientific documentation, and contributing to the understanding of parasitic biodiversity in freshwater fishes.

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