Biospectra : ISSN : 0973-7057, Vol. 14(1), March, 2019, pp. 7-12
An International Biannual Refereed Journal of Life Sciences

Animal Science

ISSN : 0973-7057

Int. Database Index: 663 www.mjl.clarivate.com

Endohelminthic parasite diversity in piscine host of Madhepura district, Bihar, India

Chandan Kumar Chand* & Arun Kumar
University Department of Zoology, B.N. Mandal University, Madhepura, Bihar, India

Received :5th November, 2018 ; Revised : 27th February, 2019

Abstract : Fishes constitute a major component of diet for the people of India and they are extensively used as a protein rich food for human consumption. The present study incorporates the diversity of the parasitic species in freshwater fishes of different water bodies from Madhepura with a view to reduce the endohelminthic infestation and protect the piscine host as healthy food resource. The diversity spectrum in the form of relative abundance and S-W diversity indices of endohelminth parasites recovered from the various piscine host species in the present study has been dealt in th elight of protecting the host form the parasites.

Key words: Endohelminths, piscine host, parasite diversity indices, protection strategy.

INTRODUCTION

Helminths are an important group of pathogens, which cause infection and diseases of fish both in freshwater and marine environments, their importance being related directly to the fish that may affect the general public health (Hoffman, 1967)[1]. As much as 30,000 helminth species have been estimated to be parasites of fishes, many of which are known to be serious menace to their hosts. Every parasite living in or on a fish extends some degree of harmful influence on its host (Williams and Jones 1994)[2]. Understanding patterns in species diversity and distribution, and evaluating the role of biodiversity in ecosystem function, remain key goals for contemporary ecologists (Sutherland *et al.* 2006)[3]. Parasitism is one of the most successful modes of life displayed by living organisms, as measured by how often it evolved and how many parasitic species are presently in existence. Studying the diversity of parasites is particularly relevant because sympatric diversification may be important in some parasite taxa, and because of the opportunity for independent tests of evolutionary hypotheses in the many separate lineages in which parasitism evolved. Patterns in the diversity of parasites may be associated with either host or parasite characteristics. The distribution of parasite diversity among host taxa does not simply reflect the species diversity of the host taxa themselves; life history and ecological traits of hosts appear to play important roles. These may determine the likelihood that hosts are colonized by parasite species over evolutionary time. Certain features of parasites may also be associated with speciation and diversification. Only parasite body size has received much attention; the patterns observed are not greatly different from those of free-living species, with small-bodied parasite taxa being more species than related large-bodied taxa. The emphasis for future research must shift from pattern description to the elucidation of the processes responsible

*Corresponding author :
Phone : 8298999188
E-mail : chandan.chand84@gmail.com

for the structure and diversity of parasite faunas. A better integration of ecological and historical (or phylogenetic) approaches to the study of parasite diversity should make this objective possible. Species diversity or richness of fish tapeworms appears to be greatest in subtropical and temperate regions. Nematodes of fish infective to humans are mostly in the tropics.

MATERIALS & METHODS

The fishes were collected and analyzed to study the parasitic diversity. The sampled fishes were analyzed in the laboratory for the presence of endohelminthic parasites. The parasites were identified and indexed. Study sites are rivers and ponds of Madhepura district in Bihar. The freshly landed fishes *Carassius auratus* and *Cirrhinus cirrosus* were collected from fish landings of Madhepura district of Bihar coast (lat. 25.8674° N and Long 86.9424°´E) in winter season. Samples were transferred to departmental laboratory aquarium. An internet search, using the keywords 'host parasite checklist' and the search engine Google, was conducted to find relevant checklists; additional searches were conducted by replacing 'host' with 'fish', and 'parasite' with 'helminth'. Only endohelminth parasites (nematodes) are considered here. Finally, only two fish host species with at least seven endoparasite species in the surveyed region were included. To observe the helminth parasites fishes were opened up vertically and the entire digestive system was removed and placed in a Petri dish with physiological saline. Fishes were identified by using the key[4,5]. Parasites were identified[6,7,8]. The external and internal organs were thoroughly examined for parasitic load. The parasites were mainly found in the gastrointestinal tract. The GIT specifically stomach and intestine was removed carefully and kept separately in Petri dish. All the parasites recovered from the different organs of gastrointestinal tract were preserved in 70% alcohol. They were cleaned and kept in small vials for the study of their morphology for identification with the help of light microscope Olympus BX43. The parasites number and place of their attachment were also recorded.

Nematodes- Nematodes were identified by the naked eye or by using lens. Specimens were washed in water or in a physiological solution and fixed in a 5% formalin Nematodes of smaller dimensions after fixation were cleared using a drop of phenol to elucidate the structures such as esophagus and oral spicules for species identifications besides the body shape and dimensions the characters such as the body cuticle, existence of spines the structure of the anterior and posterior body are important. It is also necessary to know the host and location of the nematode. After the microscopic examination the nematodes were carefully rinsed in water and transferred again into a fixative [9].

RESULT & DISCUSSION

A total of 143 fishes of *Carassius auratus* and *Cirrhinus cirrosus* were screened occurring abundantly in the Madhepura district The present study recorded nematodes belonging to the families Ascaridae, (anisakidae). In the present investigation besides the fish hosts various parasite was identified as *Chilodonella hexastica, Trichodina subtilis, Trichodina reticulate, Apiosoma piscicola, myxobolus mrigalhite, myxobolus basui,* and *myxobolus lalbaghensis.* Population of the two fishes was chosen for the helminth parasitic faunal study in Madhepura waters. Among the endohelminths recorded *Myxobolus basui* was observed to be the highest infectious parasite in *Cirrhinus cirrhosus* species. And the lowest was Apiosoma piscicola infecting the *Carassius auratus.* The site of infection was in the Gill lamellae especially in the intestine harboured maximum number of endohelminthic parasites. From the two host genera examined *Cirrhinus cirrosus* was found to be highly infected with nematode parasites in comparison to *Carassius auratus* . From all over parasitic burden 45 prasitic species have been reported from liver of *Cirrhinus cirrosus* and intestine have been reported in *Carassius auratus* as shown in table 1. It is clear from Table 1, that prevalence and infection was observed . Body of edible fishes is an environment to the parasites. Due to parasitic diseases, the growth of fishes decreases and almost ceases. Das and Goswami (2014)[10] reported that each helminths parasite species prefer to live in a definite zone of the microhabitats, though some can migrate to the other organs, which are normally not their usual site of infection. Devi *et al*., (2015)[11] have studied that many parasite species are host specific to at least some degree and are capable of infecting one or only a limited number of host species. Rukhsana *et al.*, (2008)[12] reported that due to several factors these fishes are declining

in number at a very fast rate from last few years. Chowdhury and Hossain (2015)[13] also observed that parasitic infestation has harmful influence for fish health that affects the normal growth of the fishes and mortalities as effect of the helminth parasites in terms of loss of body weight and mortality was also reported in our study. Fish frequently serve as intermediate or transport hosts for larval parasites. Wide spectrum of helminths infections is transmitted to humans by contamination of food and water as reported by Panda and Dash (2016)[14]. Ajit and Yuvraj (2015)[15] reported that fish health maintenance programs require many elements, including examination and monitoring of fish pathogens. Some of these parasites cause diseases to fish, affecting their health and reproduction, making them fall easy prey to predators and some infect man. Wali *et al.*, (2016)[16] also reported that fish carrying heavy parasitic burden are extremely lethargic just because of parasites might also alter the physiological as well as reproductive functions of hosts.

Table 1- Species diversity spectrum of endohelminths sampled from host-I *C.auratus*

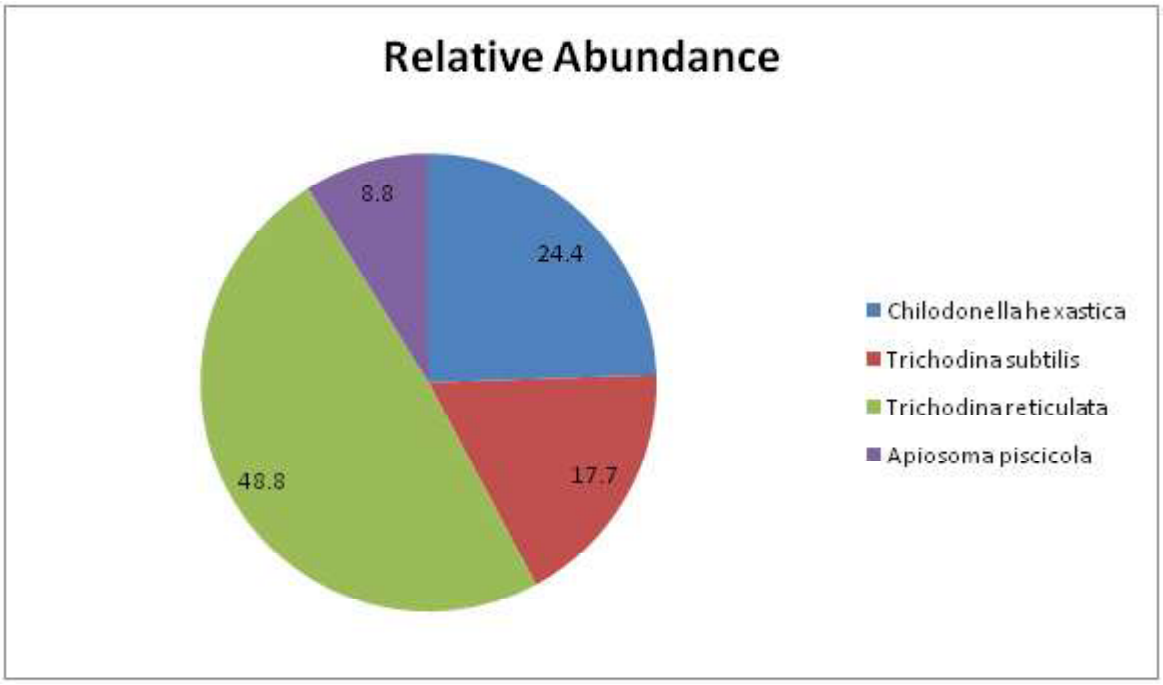
Fish host	Endohelminths recorded	No. of individuals sampled	*pi* (n / N)	Relative abundance RA= n/N x 100	*log pi*	*pi x log pi*	S-W Diversity, $H = -\sum pi\, x \log pi$
Carassius auratus	*Chilodonella hexastica*	11	0.244	24.4	-0.612	-0.149	0.525
	Trichodina subtilis	08	0.177	17.7	-0.752	-0.133	
	Trichodina reticulata	22	0.488	48.8	-0.311	-0.151	
	Apiosoma piscicola	04	0.088	8.8	-1.055	-0.092	
	Total	**45**					

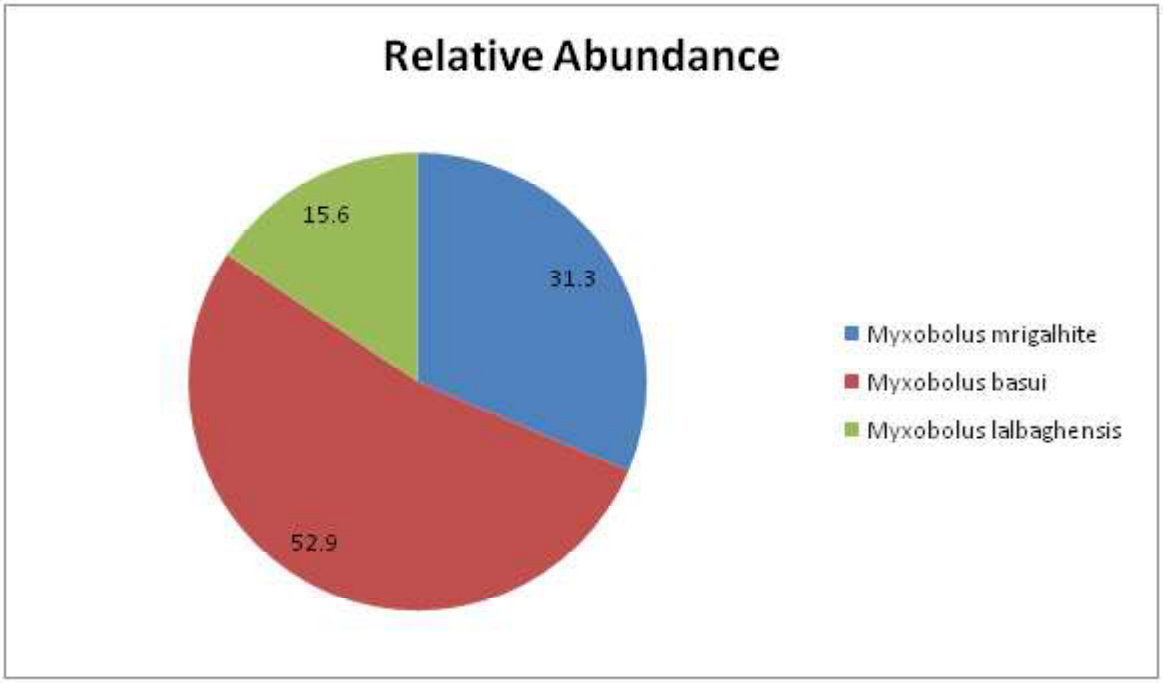
Table 2- Species diversity spectrum of endohelminths sampled from host-II *C.cirrhosus*

Fish host	Endohelminths recorded	No. of individuals sampled	*pi* (n / N)	Relative abundance RA= n/N x 100	*log pi*	*pi x log pi*	S-W Diversity, $H = -\sum pi\, x \log pi$
Cirrhinus cirrhosus	*Myxobolus mrigalhite*	16	0.313	31.3	-0.504	-0.157	0.428
	Myxobolus basui	27	0.529	52.9	-0.276	-0.146	
	Myxobolus lalbaghensis	08	0.156	15.6	-0.806	-0.125	
	Total	**51**					

CONCLUSION

Monthly observations showed that the freshwater fishes from Madhepura district harbour a heavy burden of helminthic infection. Nematodes were the dominant parasites in *Carassius auratus* and *Cirrhinus cirrosus* fish species. They were mostly found in intestine and liver. The annotations of the present work could find out the species *Chilodonella hexastica, Trichodina subtilis, Trichodina reticulate, Apiosoma piscicola, Myxobolus mrigalhite, Myxobolus basui,* and *Myxobolus lalbaghensis*.


Relative Abundance
8.8
24.4
48.8
17.7
Chilodonella hexastica
Trichodina subtilis
Trichodina reticulata
Apiosoma piscicola


Relative Abundance
15.6
31.3
52.9
Myxobolus mrigalhite
Myxobolus basui
Myxobolus lalbaghensis

ACKNOWLEDGEMENT

Authors are thankful to the University Department of Zoology, B. N. Mandal University, Madhepura for providing lab facilities

REFERENCES

1. **Hoffman GL. 1967.** Parasites of North American freshwater fishes. Berkeley: University of California Press. p. 486.
2. **Williams HM, Jones A. 1994.** Parasitic worms of fish. Taylor and Francis, London, p 563
3. **Sutherland, W. J. 2006.** The identification of 100 ecological questions of high policy relevance in the UK. *J. Appl. Ecol.* **43:** 617–627.
4. **Munro ISR. 1955.** The marine and freshwater fishes of Ceylon. Canberra Dept. External Affairs, 997 pp.
5. **Talwar PK, Kacker RK. 1990.** Commercial sea fishes of India. Calcutta, 997 pp.
6. **Hafejullah H, Dutta IB. 1998.** Digenitic trematodes of fishes. *Zool.Surv.India* state fauna series*Fauna of West Bengal*, **3(2):** 133-222.
7. **Hyman LH. 1951.** The invertebrate's platy helminthes and Rhynchocoela. *The Acolomate Bilateral II, Mc Graw Hill, New York*, 250pp.
9. **Zdenek Lucky. 1977.** Methods for the diagnosis of fish diseases: The identification of animal parasites. Franklin Book Programs Inc, Cairo, 140p.
10. **Das, D., Goswami, M.M. 2014.** Distribution of Helminth parasites in different Organs and their seasonal rate of infestation in three Freshwater Fishes of Goalpara, Assam, India, *Research Journal of Animal, Veterinary and Fishery Sciences,* **2(9):** 13-17
11. **Devi, N.U., Singh, N.R., Kar, D. 2015**. Studies on Fish Affected with Epizootic Ulceric Syndrome with Special Emphasis on Parasitic Infestation-A Project Report, Biological Forum – *An International Journal,* **7(1):** 155-164.
12. **Rukhsana, A., Chishti, M.Z., Fayaz, A.R., Bilal, A.B., Firdousa, A. 2008.** Comparative Studies on Helminth Parasites of Declined Fish *Schizothorax esocinus* from two Water Bodies. 4th JK Science Congress, 194.
13. **Chowdhury, S.Z., Hossain, M.M. 2015**. Isolation and characterization of internal parasites in snakehead. *Int. Jour. of Fish.and Aqu.Stu.* **2(4):** 17-22.
14. **Panda, S., Dash, G. 2016.** Isolation and identification of helminth parasitic eggs having zoonotic potency from sewage-fed pond sediments. *Int. J. of Adv. Research in Biological Sciences*, **3(6):** 283-291.
15. **Ajit, K., Yuvraj, B. 2015.** Biodiversity and prevalence of Helminth parasites of Girna Dam Fishes. *Int. J. of Life Science, Special Issue*, **A3:**42-48.
16. **Wali, A., Balkhi, M.H., Darzi, M.M., Maqbool, R., Shah, F., Bhat, B.A., and Wani, N. 2016.** Histopathological alterations and distribution of *Adenoscolex oreini* in intestines and their seasonal rate of infestation in three freshwater fishes of Kashmir. *Int. J. of Fisheries and Aquatic Studies*, **4(3):** 532-537.

***