



Epidemiology of crustacean ectoparasites in freshwater carps at Balrampur, U.P.

Alpana Parmar, Sadguru Prakash*

Department of Zoology, M.L.K.P.G. College, Balrampur, Uttar Pradesh, India

Abstract

Carp culture plays an important role in inland fisheries sector in India. Parasitism is a factor that negatively affects fish production and ectoparasitic crustacean are the common fish parasites found in freshwater ponds. Total 150 indigenous and exotic carps with 25 fish of each species were collected from fresh ponds of Balrampur city. Fish sample collected were divided into three group small (<10cm), medium (10-15cm) and in larger length group (>15cm). Total 293 parasites were collected from infected fishes. The number of infected fish samples was 59 out of 150. Three crustacean ectoparasites viz., *Ergasilus* sp., *Lernaea* sp. and *Argulus* sp. were collected from scales, gills, skin and base of fins of fishes. The highest number of parasitic infections was found to be *Argulus* sp. (52.55%) followed by *Lernaea* sp. (31.06%) and *Ergasilus* sp. (16.38%). The highest abundance and mean intensity of fish parasites were observed in lowest length group (<10cm) followed by median length group (10-15cm) and highest length group (>10cm) of fishes in all the six species. In present investigation the general mean intensity of infection in indigenous carp was higher than exotic carp. Rate of infection was maximum in lowest length group than highest, but prevalence of infection was maximum in median length group of fishes (Except common carp) than lowest and largest groups.

Keywords: Carps, crustacean parasites, incidence, intensity, abundance

Introduction

Fish have a high nutritional value since they are consumed by a huge number of people globally and contribute significantly to overall nutrition, making them a valuable food source.

In farmed fish, parasitic crustaceans are becoming a more significant issue as they can spread to wild populations. The majority of freshwater parasite crustaceans are visible to the unaided eye when they cling to the host fish's gills, skin, and base of fins. Common parasites on the gills of freshwater fish, small crustaceans or copepods appear as white patches on the fish (Misganaw and Getu, 2016) [7]. The prevention of disease and the maintenance of a positive interaction between organisms and their surroundings are essential for the health of any living creatures. The parasite community of fish typically exhibits significant diversity depending on the environment in which fish live (Prakash and Singh, 2020) [12]. Diseases are the most important limiting factors in pisciculture, due to the increased fish density in small waterbodies where fish pathogens or parasites can easily transmit from one fish to another (Prakash *et al.*, 2011) [9]. The parasites have the potential to induce death and illness in cultivable fishes, which would greatly reduce fish production as well as economic loss to cultivators (Prakash and Verma, 2017) [10]. One of the most significant issues with pond fish culture is fish ectoparasites.

Different ectoparasites (protozoans, trematodes, and crustaceans) that have a direct life cycle and permit transmission from host to host are the primary causes of fish diseases in fish pond (Prakash and Verma, 2020) [11]. These diseases have the potential to wipe out whole fish populations, causing enormous financial loss for fish producers. Some parasites are major pests for capture fishes, while others may pose a harm to cultivable fish. The success of the fisheries development project and the blue revolution, on the other hand, depend on stepping up research into fish parasitology since a healthy fish population is the primary

prerequisite for improving fish productivity. Thus, appropriate fish health management is required to stop the financial loss and to sustain present fish production. The most popular culturable freshwater fish in eastern Uttar Pradesh are major indigenous and exotic carps because to the easy availability of fish seed (fry and fingerlings). In light of the aforementioned information, the current study set out to determine the prevalence, severity, and quantity of ectoparasites in main and exotic carp.

Material and Methods

One hundred fifty Indian major carp, Catla (*Catla catla*), Rohu (*Labeo rohita*) and Mrigal (*Cirrhinus mrigala*) as well as exotic carp Silver carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharyngodon idella*) and common carp (*Cyprinus carpio*) of various length were collected from several fishery ponds of Balrampur between July, 2022 to June, 2023 and they were then sent to the Ichthyology Lab, Department of Zoology, M.L.K.P.G. College, Balrampur. The fishes were examined immediately after collection for detailed investigation of crustacean ectoparasites.

The external surface of the host fish, including the scales, fins, skin, and fin base, was examined under a magnifying glass for ectoparasites or any type of lesion in order to invest and collect the crustacean ectoparasites. Subsequently, the skin was scraped using a scalpel to gather mucus in a petri dish for microscopic analysis. Subsequently, the branchial cavity's gills were extracted and transferred to a glass plate for microscopic analysis. Ectoparasitic were placid in petri dish with the help of a brush and were placed under a compound microscope to identified the crustacean ectoparasites by following the description and figures of Bowen (1966) [2], Hoffman (1980) [3], Lucky (1977) [5], Singhal *et al.*, (1984) [14] and Mukherjee *et al.*, (2019) [8]. Prevalence, abundance and mean intensity were calculated by formula given by Margolis *et al.* (1982) [6].

Results and Discussion

Total 293 parasites were noticed which belong to three genera i.e. *Ergasilus* sp., *Lernaea* sp. and *Argulus* sp. of Crustacean and total 59 fishes were found infected out of 150. These parasites were attached on skin, scale, operculum, gill and fin base. Presence of these crustacean parasites on gills, skin and fins of host fishes were also observed by some ichthyologists (Bhuiyan *et al.*, 2007; Prakash *et al.*, 2011; Prakash and Verma, 2020; Prakash *et al.*, 2021) [7, 9, 11, 13]. The crustaceans were mainly found abundantly attached to fin base and skin.

The highest number of parasitic infections was found to be *Argulus* sp. (52.55%) followed by *Lernaea* sp. (31.06%) and *Ergasilus* sp. (16.38%) (Table1). The highest mean intensity and abundance of fish parasites were observed in lowest length group (<10cm) followed by median length group (10-15cm) and highest length group (>10cm) of fishes in all the six species (Table 2). In present investigation the general mean intensity of infection in indigenous carp was higher than exotic carp. Similar finding was also noticed by Prakash *et al.*, (2021) [13].

Table 1: List of Identified Crustacean Ectoparasites, Host fishes and their infection sites

Order	Genera	Total number of Parasites	% age of Parasites	Host	Infection Sites
Copepoda	<i>Ergasilus</i> sp	48	16.38	Catla, Silver carp Grass carp	Skin, Gill
	<i>Lernaea</i> sp.	91	31.06	Rohu, Mrigal, Silver carp Common carp,	Scale, Skin, Operculum
Branchiura	<i>Argulus</i> sp.	154	52.55	Catla, Rohu, Mrigal, Silver carp, Grass carp, Common carp,	Skin, Scale, Fin base,
Total Genus	03	293	100		

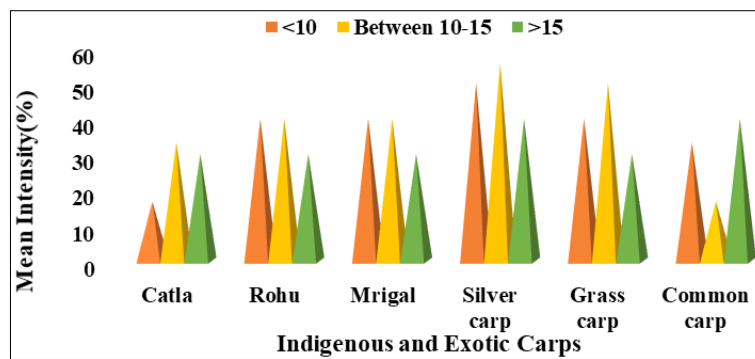


Fig 1: Mean intensity of crustacean parasites in different length group of freshwater carps

In present investigation the order of abundance in all the fish species were Silver carp > Common carp> Mrigal> Grass carp> Rohu> Catla. The order of intensity of infection

in all the fish species were Grass carp > Catla > Mrigal> Rohu>Silver carp > Common carp.

Table 2: Population dynamics of crustacean parasites in different length group of freshwater carps

Host Fish Species	Length group of fishes (cm)	No. of Fish Examined	No. of fish infected	Total number of fish parasites recorded	Mean intensity of fish parasites unit	Abundance unit	Prevalence (%)
Indian Major Carps							
<i>Catla catla</i> (Catla)	<10	6	1	3	33.33	0.50	16.66
	10-15	9	3	11	27.27	1.22	33.33
	>15	10	3	18	16.67	1.80	30.00
	Total	25	7	32	21.88	1.28	28.00
<i>Labeo rohita</i> (Rohu)	<10	10	4	13	30.77	1.30	40.00
	10-15	5	2	7	28.57	1.40	40.00
	>15	10	3	24	12.50	2.40	30.00
	Total	25	9	44	20.45	1.76	36.00
<i>Cirrihinus mrigala</i> (Mrigal/Naini)	<10	11	5	15	33.33	1.36	40.00
	10-15	4	2	7	28.57	1.75	40.00
	>15	10	4	30	13.33	3.00	30.00
	Total	25	11	52	21.15	2.08	44.00
Exotic carps							
<i>Hypophthal-michthys Molitrix</i> (Silver carp)	<10	6	3	11	27.27	1.83	50.00
	10-15	9	5	22	22.73	2.44	55.55
	>15	10	4	28	14.29	2.80	40.00
	Total	25	12	61	19.67	2.44	48.00
<i>Ctenophar-yngodon idella</i>	<10	5	2	6	33.33	1.20	40.00
	10-15	10	5	16	31.25	1.60	50.00

(Grass carp)	>15	10	3	23	13.04	2.30	30.00
	Total	25	10	45	22.22	1.80	40.00
<i>Cyprinus carpio</i> (Common carp)	<10	3	1	5	20.00	1.66	33.33
	10-15	12	5	26	19.23	2.16	16.66
	>15	10	4	28	14.29	2.80	40.00
	Total	25	10	59	16.95	2.36	40.00

The rate of infection was more in smaller length group than larger, but prevalence of infection in median group was more (Except common carp) than smaller and larger groups. The present finding agrees with those of Bhuiyan *et al.*, (2007) [1]. The maximum prevalence in indigenous carp was found in Mrigal followed by Rohu and Catla whereas in exotic carp was concerned the maximum prevalence was found in Silver carp followed by grass carp and common carp. The order of prevalence in all the fish species were Silver carp > Mrigal> Grass carp= Common carp> Rohu> Catla.

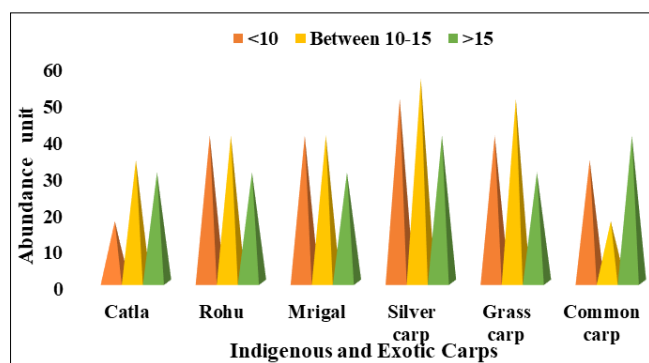


Fig 2: Abundance of crustacean parasites in different length group of freshwater carps

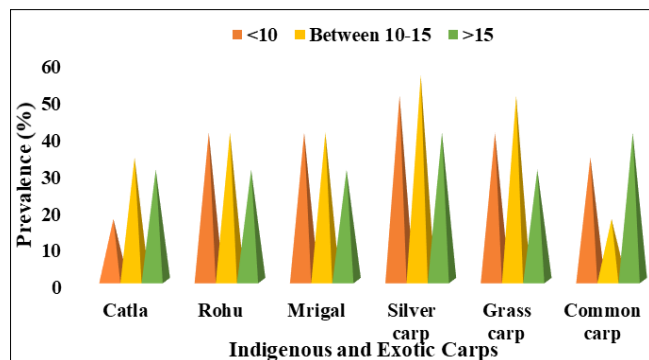


Fig 3: Prevalence of crustacean parasites in different length group of freshwater carps

The fishes infected with *Ergasilus* and *Lernaea* show clinical signs like restlessness, increasing beating rate of operculum, frequent surface visit and opening of mouth for grasping the air whereas the fishes infected with *Argulus* shows clinical sign like iritic movement, red patches at the site of infection, loss of scale and ulceration on body surface. Similar observation was also reported in crustacean parasites of fresh water fishes by Prakash *et al.*, (2021) [13]. Fishes inhabiting unfavourable environmental condition or stress conditions are suffering from various types of diseases (Jhingran and Pullin, 1985; Mukherjee *et al.*, 2019) [4, 8].

Acknowledgements: Authors are thankful to Principal, M.L.K. (P.G) College, Balrampur for providing essential laboratory facilities.

References

- Bhuiyan AS, Akther S, Musa GM. Occurrence of parasites in *Labeo rohita* (Hamilton) from Rajshahi. *Univ. J. Zool. Rajshahi Uni*,2007;26:31-34.
- Bowen JT. Parasites of freshwater fish; IV, Miscellaneous 4. Parasitic copepods *Erqasilus*, *Achtheres* and *Salmincola*; *Bureau Sport Fisheries and Wildlife*,1966;4:1-4.
- Holfman GL. Parasitic diseases of laboratory fishes and their control; *J. Fish Dis*, 1980, 3348-359.
- Jhingran VG, Pullin RS. A hatchery manual for the common, Chinese and Indian major carps. Asian Development Bank, Manila, Philippines. *ICARM Studies and Reviews*, 1985, 11-191.
- Lucky Z. Methods for the Diagnosis of Fish Diseases (New York: Amerind Publishing Co. Pvt. Ltd.), 1977, 81-125.
- Margolis L, Esch GW, Holmer JC, Kuris AM, Schad GA. The use of ecological terms in parasitology. *Journal of Parasitology*,1982;68:131-133.
- Misganaw K, Getu A. Review on Major Parasitic Crustacean in Fish. *Fisheries and Aquaculture Journal*,2016;7(3):175.
- Mukherjee D, Soni M, Sanyal KB, Dash G. Prevalence of ectoparasitic infestation in Indian majorcarps during winter at different blocks of south 24-ParganasDistrict, West Bengal, India. *Journal of fisheries Science*,2019;1(1):7-14.
- Prakash S, Gupta S, Kumar A. Prevalence of ectoparasites on fingerlings of indigenous major carps at Balrampur (U.P.). *Bioherald (Int. Jour. Of Biodiversity & Environment)*,2011;1(2):157-158.
- Prakash S, Verma AK. Incidence of parasites in *Labeo rohita* (Hamilton) at Balrampur (U.P.). *Life Science Bulletin*,2017;14(2):181-183.
- Prakash S, Verma AK. Seasonal variations in prevalence of ectoparasitic infestation on Indian major carps at Balrampur, U.P., India. *Uttar Pradesh Journal of Zoology*,2020;41(10):121-127.
- Prakash S, Singh D. Seasonal variation of Helminth Parasites in fresh water fishes of Sauwan Nallah of Balrampur, U.P., India. *International Journal of Scientific Research in Biological Sciences*,2020;7(4):26-29.
- Prakash S, Yadav DK, Jaiswal L. Population dynamics of crustaceans parasites of fresh water fishes at Bahraich, U.P. *Int. Journal of Zoology and applied Biosciences*,2021;6(1):15-18. <https://doi.org/10.5281/zenodo>.
- Singhal RN, Swarn J, Davies RW. Ectoparasites of the freshwater food fishes of Haryana. *Proc.Indian.Acad. Sci. (Anim.Sci.)*,1984;93(7):663-669.