International Journal of Zoology and Applied Biosciences **ISSN: 2455-9571**
Volume 6, Issue 1, pp: 15-18, 2021
https://doi.org/10.5281/zenodo.4495326
http://www.ijzab.com

Research Article

POPULATION DYNAMICS OF CRUSTACEAN PARASITES OF FRESH WATER FISHES AT BAHRAICH, U.P

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Article History: Received 17th January 2021; Accepted 31st January 2021; Published 2nd February 2021

ABSTRACT

An investigation was made on the population dynamics of crustacean ectoparasites of some freshwater carps and catfishes during October, 2019 to September, 2020. Out of 303 examined fishes 37 fishes were found infected with total 81 crustacean ectoparasites. The incidence, intensity and abundance of crustacean parasites were high in carps than the catfishes. The result also revealed that exotic carps were more susceptible to crustacean parasites than indigenous carps. Four genera of crustacean parasites were identified as copepods (*Ergasilus, Lernea* and *Lamproglena*) and Branchiura (*Argulus*) from gills, skin and fins of infected fishes during study period.

Keywords: Incidence, Intensity, Abundance, Copepod, Branchiura, Carps, Catfishes.

INTRODUCTION

Fishes are the important source of protein for human and also play an important role in national economy as it provides employment opportunity too. Diseases affect the normal health conditions and cause reduction of growth, abnormal metabolic activities and even death. With increasing interests in aquaculture, fish parasites and their infections are the matter of concern since they affect productivity especially inland culture fishery by decreasing their reproductive potential, market and nutritive value (Sadguru & Verma, 2020). Parasitic diseases are the limiting factors in fish culture, because of increased density of fish in lentic water bodies where the fish pathogens can easily transmit from one fish to another. The parasites may result in poor growth, postpone sexual maturity and mortality as well as morbidity in cultivable fishes resulting in great loss in fish production as well as economic loss to the culturists (Prakash & Verma, 2017; Sadguru & Verma, 2020).

Crustacean constitutes near about 4500 species and it is the second largest class of the Phylum Arthropod. Most of the crustaceans are free living, some are sessile and few are parasitic. The parasitic crustaceans affecting commercially important fishes are belongs to only sub class Copepod, Branchiura and Isopoda. Due to small and microscopic size copepods are most common parasitic crustaceans. Male parasitic copepod dies after copulation in pre adult stage hence only mature female attached to fish. These parasites deteriorate the normal health condition of fish and cause fish mortality, thus results great economic loss. Fish parasites directly or indirectly related to human and domestic animals health because several parasites can be transmitted to humans and domestic animals only through fish (Prakash, 2020). Fishes are important components of ecosystem from ecological, medicinal, nutritional and economical point of view, keeping in view, importance of crustacean infections of freshwater fish; present study was designed to evaluate population dynamics of crustaceans parasitizing freshwater fishes of Bahraich districts of U.P., India.

MATERIALS AND METHODS

The live or freshly dead freshwater carp (Catla, *Catla catla*; Rohu, *Labeo rohita*; Nanni, *Cirrhinus mrigala*; Silver carp, *Hypophthalmichthys molitrix* and Common carp, *Cyprinus carpio*) and catfishes (Singhi, *Heteropneustes fossilis*;

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Mangur, *Clarias batrachus* and Tengara, *Mystus vittatus*) were randomly collected from different water bodies of Bahraich district during October, 2019 to September, 2020 with the help of fisherman and transported 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 parasites. The external surface such as scales, fins, skin and fin base of host fishes were examined under a magnifying glass for crustacean parasites or any kind of lesions. Then scrapping of the skin was done by a scalpel to collect the mucus in a petri dish for microscopic examination. After that gills were removed from the bronchial cavity and placed on the glass slide for microscopic examination. From these crustacean parasites were collected by a hairbrush then fixed according to standard method (Lucky, 1977) and identified according to "Parasitic copepod and Branchiura" of Fishes by Yamaguchi (1963). Incidence (%), Mean Intensity (%) and Abundance of crustacean parasites were determined by using following formula.

$$\text{Incidence (\%)} = \frac{\text{Total No. of infected fish (Host)}}{\text{Total No. of fish (Host) Examined}} \times 100$$

$$\text{Intensity of Infection (\%)} = \frac{\text{Total No. of Parasites collected}}{\text{Total No. of infected fish (Host)}} \times 100$$

$$\text{Abundance (\%)} = \frac{\text{Total No. of Parasites collected}}{\text{Total No. fish (Host) Examined}} \times 100$$

RESULTS AND DISCUSSION

Total 303 fresh water fishes (184 Carps and 119 Cat fishes) were randomly collected from different water bodies of Bahraich district during October, 2019 to September, 2020. Out of 303 fishes 37 fishes were found infected with total 81ectoparasites (Table1).

Table 1. Population dynamics of crustacean parasites from fresh water fishes.

Name of Fish	No. of Fishes		No. of Parasites Collected	Incidence (%)	Intensity (%)	Abundance (%)
	Examined	Infected				
			Carps			
C. catla	30	04	08	13.33	2.00	0.26
L.rohita	42	05	12	11.90	2.40	0.28
C. mrigala	51	07	15	13.72	2.14	0.29
H.molitrix	22	05	09	22.27	1.80	0.40
C. carpio	39	07	13	17.94	1.85	0.33
Total	184	28	57	15.21	2.03	0.31
			Cat fishes			
H.fossilis	41	04	07	9.75	1.75	0.17
C.batrachus	43	03	11	6.97	3.66	0.25
M.vittatus	35	02	06	5.71	3.00	0.17
Total	119	09	24	7.56	2.66	0.20

In the present study the incidence, intensity and abundance of crustacean parasites were high in carps than the catfishes (Table 1). In carp, incidence of infection was recorded 15.21% in which maximum incidence of infection was recorded in *Hypophthalmichthys molitrix* (22.27%) followed by *Cyprinus carpio* (17.94%), *Cirrihinus mrigala* (13.72%), *Catla catla* (13.33%) and *Labeo rohita* (11.90%). Intensity of infection in carp fishes were observed 2.03% in which maximum intensity was recorded in *Labeo rohita* (2.40) followed by *Cirrihinus mrigala* (2.14), *Catla catla* (2.0), *Cyprinus carpio* (1.85) and *Hypophthalmichthys molitrix* (1.80). The abundance of infection in carp fishes were recorded 0.31. The maximum abundance was observed in *Hypophthalmichthys molitrix* (0.40) followed by *Cyprinus carpio* (0.33), *Cirrihinus mrigala* (0.29), *Labeo rohita* (0.28) and *Catla catla* (0.26).

In comparison to carps, catfishes show minimum infection of crustacean parasites. Out of 119 catfishes, only 9 fishes were found infected with 24 numbers of crustacean parasites with incidence of infection 7.56%. Maximum incidence of infection was observed in *Heteropneustes fossilis* (9.75%) followed by *Clarias batrachus* (6.97%) and *Mystus vittatus* (5.71). Intensity of infection in catfishes was observed 2.66. Maximum intensity of infection was observed in *Clarias batrachus* (3.66) followed by *Mystus vittatus* (3.00) and *Heteropneustes fossilis* (1.75). Abundance of infection in catfishes was observed 0.20. The maximum abundance was recorded in *Clarias batrachus* (0.25) followed by *Heteropneustes fossilis* and *Mystus vittatus* (0.17). Among the collected parasites, 04 genus of crustacean parasites were identified.

Table 2. Distribution pattern of crustacean ectoparasites.

Crustacean	Name of Parasites	Host Fishes	Site of Infection
Copepod	*Ergasilus* (Gill Lice)	*C. catla, H. molitrix,*	Gill
	Lernea (Anchor worm)	*C. carpio, L. rohita, M.vittatus*	Skin
	Lamproglena	*C. mrigala, C. carpio, H.fossilis, C. batrachus,*	Gill
Branchiura	*Argulus* (Fish Lice)	*L. rohita, C. mrigala, H. molitrix, C. carpio, C. batrachus*	Skin, Fin

Out of four crustaceans, three were belonging to copepod and rest one was belonging to Branchiura. Copepods (*Ergasilus*, *Lernea* and *Lamproglena*) were collected from gills and skin; while Branchiura (*Argulus*) was collected from the skin and fin base of the host fishes (Table 2). In the present study *Argulus* was dominant crustacean parasite followed by *Lamproglena*, *Lernea* and *Ergasilus*. *Argulus* (Fish lice) was collected from skin and fin base of *Labeo rohita, Cirrihinus mrigala*, *Hypophthalmichthys molitrix* and *Cyprinus carpio*. *Lamproglena* was collected from the gills of *Cirrihinus mrigala*, *Cyprinus carpio*, *Heteropneustes fossilis* and *Clarias batrachus*. *Lernea* (Anchor worm) was collected from the skin of *Cyprinus carpio, Labeo rohita* and *Mystus vittatus* while *Ergssilus* (Gill lice) was collected from gills of *Catla catla* and *Hypophthalmichthys molitrix* (Table 2). Presence of these ectoparasites on gills, skin and fins of host fishes were also reported by some researchers (Banerjee & Bandyopadhyay, 2010; Bhuiyan *et al*., 2007; Prakash *et al*., 2011; Sadguru & Verma, 2020) in Indian major carps. Lernea was found on the skin and fin of indigenous and exotic carps (Tasawar *et al*., 2001; Tasawar *et al*., 2009; Tasawar & Shazad, 2001). Fishes infected with *Ergasilus* and *Lamproglena* show clinical signs like restlessness, rapid movement of operculum, frequent visit to surface, opening of mouth for grasping the air and finally death of some fishes with sign of asphyxia (opened mouth). Fishes infected with *Lamproglena* and *Argulus* show clinical sign like irregular movement, red patches at the site of infection, ulceration on the body surface and loss of scales and fins. It is evident from the available literature that unfavorable or poor environmental or ecological conditions caused variety of fish diseases (Mukherjee *et al*., 2019). Fishes were susceptible to a wide range of parasites and diseases when under stress from poor environmental condition and inadequate feeding (Jhingran & Pullin, 1985). The fingerlings are delicate and more susceptible to pathogenic infection because of their immature immune system (Mortuza & Al Misned, 2015). Since the fingerlings require more O_2 and due to lack of O_2 they become more prone to infection. High stocking density of fingerlings is another reason for ectoparasitic diseases outbreak (Hossain *et al*., 2008).

CONCLUSION

The result of present investigation indicated that the incidence, intensity and abundance of crustacean ectoparasites were highest in freshwater carps in comparison to catfishes. It can be also concluded that exotic carps were more susceptible to crustacean parasites than indigenous carps. The high organic load as well as high organic stocking density and poor quality of aquatic environmental condition reduces the metabolic activities, which in turn made the fishes more susceptible to parasitic infections either directly or indirectly. High stock density increases the possibility of transmission of ectoparasites from fish to fish easily. Therefore, it is concluded that the healthy water quality should be maintained properly to avoid the appearance of parasites in the water bodies. There is need to carried out more study on the parasitic diseases of fishes in relation to biotic factors.

ACKNOWLEDGEMENT

The authors are thankful to the Principal M.L.K.P.G. College, Balrampur, U.P. for providing laboratory facilities to complete this investigative work.

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