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Research Article

PROTOZOAN PARASITES OF FISHES FROM CHITTORGARH RESERVOIR, BALRAMPUR DISTRICT (U.P.)

[1]*Sadguru Prakash, [2]Dilip Kumar Yadav and [3]Lavi Jaiswal

[1]Department of Zoology, M.L.K.P.G. College, Balrampur 271201, U.P., India
[2]Department of Zoology, Kisan P.G. College, Bahraich 271801, U.P., India.
[3]Department of Environmental Science, Kisan P.G. College, Bahraich 271801,U.P., India

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ABSTRACT

The present study was conducted to find out the prevalence, intensity and density of protozoan parasites of freshwater catfishes. Total four species of protozoan parasites were collected from 294 fishes. Out of four, three were ectoparasites and remaining one was endoparasite. Among the ectoparasites, *Ichthyoptherius* is the most prevalent parasites followed by *Trichodina* and *Myxobolus.* Among the infected fishes, *Wallago attu* (37.80%) harbored maximum number of ectoparasites followed by *Clarius batrachus* (33.78%), *Heteropneustes fossilis* (32.86%), and *Mystus vittatus* (26.47%). In the present investigation it was observed that none of *Wallago attu* and *Mystus vittatus* was infected with *Trypanosoma*, endoparasitic protozoa.

Keywords: Prevalence, Intensity, Density, Ciliates, flagellate, Myxozoan.

INTRODUCTION

Fisheries sector is very important not only as a main source of animal protein to ensure food security but also to improve employment and income for poverty elimination in developing countries like India. In India inland fisheries sector has grown from 29% in 1950-51 to 55% at present providing livelihood to 25million people, revenue earned was 15000 crores in 2020. Although fish production has increased manifold in India but freshwater productivity especially inland culture fishery decreases due to various parasites which affect the metabolic activities, normal health conditions and even death of culturable fishes 2021(Prakash 2021; Prakash *et al*., 2021). Because of increased stocking density of fishes in fishery ponds, fish pathogens can easily transmit from one fish to another. Since these pathogen affect the reproductive potential of host fishes, a parasitic disease reduces the fish production, profitability, and market as well as nutritive values, thus results great economic loss (Prakash & Verma, 2017, 2020; Prakash *et al*., 2020).

Among the various parasites, parasitic protozoa play an important role in the growth and development of fishes and most hazardous threats to fish health. These parasites attack the fish and causes great loss of skin and gill epithelium. Even moderate infection of these parasites may cause a fatal disease, since the infected fish lose its appetite and stop feeding (Meyer, 1991). The changes brought by the parasite in the host may be due to the mechanical damage or due to the release of toxin by the parasite. Extensive works on the protozoan parasites of fish have been carried out by some worker (Aguilar-Aguilar & Islas-Ortega, 2015). The distribution, incidence and intensity of infestation of fish parasites vary from one place to another (Rahman & Saidin, 2011). Fish parasites directly or indirectly related to the human and domestic animals health because several parasites can be transmitted to humans and domestic animals only through fish. Fish disasters in fish farms causes by different ectoparasites (protozoa, monogenetic trematoda and crustacea), which have direct life cycle and facilitate translocation from host to host making huge damages to fish wealth (Al-Marjan & Abdullah, 2009). Studies on parasitic diseases of fishes particularly in this tarai region of eastern Uttar Pradesh are fragmentary. Keeping in view, importance of parasitic infection to freshwater fishes, present study was designed

*Corresponding Author: Dr. Sadguru Prakash, Assistant Professor, Department of Zoology,
M.L.K. P.G. College, Balrampur 271201, U.P., India Email: asdguruprakash@ gmail.com

to evaluate prevalence, intensity, density and index of infection of protozoan parasites in freshwater fishes of Chittorgarh reservoir from Balrampur district of eastern U.P.

The study area, Chittorgarh reservoir of Balrampur district is situated in North-Tarai region of Uttar Pradesh adjacent to Indo-Nepal border at 27^0 N to 27^0 north latitude and 82^0E to 82^0 east longitude and an altitude of about 113 meters above the mean sea level. The selected water body, Chittorgarh reserviour of Balrampur district of U.P. has peculiarity as it situated in hilly region. The water comes from seven Nallaha of these hills. The reservoir is rich in flora and fauna around and in as there is no any factory in the catchment area hence it is totally free from pollution load. The reservoir is basically constructed for irrigation purpose, but now it is also utilized for fish culture.

MATERIALS AND METHODS

Fresh water cat fishes *Clarias batrachus, Heteropneustes fossilis, Wallago attu* and *Mystus vittatus* were randomly collected in every month from Chittorgarh reservoir during Jan. 2020 to Dec 2020 and were observed for parasitic infection. Live infected fishes were brought to the laboratory and kept in small plastic aquaria containing freshwater. For examined the flagellates, endoparasitic protozoan, thin films of blood smear slides were prepare and left to dry in air. For examined the ectoparasitic protozoan parasites, the mucus of gills and body surface were collected by pipette, dropper and needle on a slide. With a drop of 0.5 N NaCl solutions, mucus smear slide were prepared and air dried. These air dried smear slides were placed in absolute methyl alcohol for 10 minutes than stained with the Geimsa stain for 20 to 30 minutes. Washed the slide in distilled water to remove excess stain, and then allow the smear to dry and mount in DPX. The collected parasites were identified under a compound light microscope with the help of standard literature (Kabata, 1985; Lucky, 1977; Mukherjee *et al*., 2019). Prevalence of ectoparasitic infection was calculated by following the formula (Margolis *et al*., 1982).

$$\text{Prevalence \%} = \frac{\text{Total no. of infected fishes}}{\text{Total no. of fish examined}} \times 100$$

$$\text{Intensity of Infection} = \frac{\text{Total no. of parasites collected}}{\text{Total no. of infected fish examined}}$$

$$\text{Density of Infection} = \frac{\text{Total no. of parasites collected}}{\text{Total no. of fish examined}}$$

RESULTS AND DISCUSSION

Total 294 freshwater catfishes (*C. batrachus, H. fossilis, W. attu* and *M. vittatus*) were examined for identifying the parasitic protozoan. Out of 294 examined fishes, only 97 fishes were found infected with protozoan parasites. Among the collected parasites three were identified as ectoparasites (*Trichodon, Ichthyoptherius* and *Myxobolus*) and remaining one is endoparasite (*Trypanosoma*) (Table 1).

Table 1. Protozoan parasites of fishes in Chittorgarh reservoir, Balrampur.

Group	Genus	Type	Host	Infected organ
Flagellate	*Trypanosoma*	Endoparasite	*Clarias batrachus, Heteropneustes fossilis,*	Blood
Ciliate	*Trichodina, Ichthyoptherius*	Ectoparasite	*Clarias batrachus, Heteropneustes fossilis, Wallago attu, Mystus vittatus*	Gills and Skin
Myxozoan	*Myxobolus*	Ectoparasite	*Clarias batrachus, Heteropneustes fossilis,*	Gills

Table 2. Prevalence of protozoan ectoparasites in different freshwater catfishes.

Host Fish	No of Fishes Examined	Total no. of infected fishes	Total No. of Parasite collected	Prevalence (%)
Clarias batrachus	74	25	33	33.78
Heteropneustes fossilis	70	23	28	32.85
Wallago attu	82	31	27	37.80
Mystus vittatus	68	18	24	26.47
Total	294	97	112	32.99

Table3. Prevalence, intensity and density of ectoparasitic protozoan in different freshwater cat fishes in Chittorgarh reservoir, Balrampur.

Host Fishes	No. Fishes Examined	Total No. of fish infected	Name of Parasite	Total no. of Fishes Infected with each parasite	Total No. of Parasite collected	Prevalence %	Intensity	Density
Clarias batrachus	74	25	*Trichodina,*	10	25	13.51	2.50	0.34
			Ichthyoptherius	15	29	20.27	1.93	0.39
			Myxobolus	08	17	10.81	2.13	0.36
Heteropneustes fossilis,	70	23	*Trichodina,*	9	14	12.86	1.56	0.20
			Ichthyoptherius	12	19	17.14	1.58	0.27
			Myxobolus	07	12	10.00	1.71	0.17
Wallago attu	82	31	*Trichodina,*	15	22	18.29	1.47	0.27
			Ichthyoptherius	12	18	14.63	1.50	0.22
Mystus vittatus	68	18	*Trichodina,*	13	17	19.12	1.31	0.25
			Ichthyoptherius	11	18	16.18	1.64	0.26

Among the infected fishes, *W. attu* harboured maximum number of ectoparasites (31) followed by *C. batrachus* (25), *H. fossilis* (23), and *M. vittatus* (18) (Table 2). In the present investigation it was observed that none of *Wallago attu* and *M, vittatus* were infected with *Trypanosoma*, an endoparasitic protozoa (Table1). Ectoparasitic protozoans are commonly found on the gills of host fishes. The infected fishes show following clinical sign: swim rapidly and rub their bodies against the substratum; the fish come on the surface for gasping the oxygen and become lethargic and eventually stop feeding. The highest prevalence rate was observed in *W. attu* (37.80%) followed by *C. batrachus* (33.78%), *H. fossilis* (32.86%), and *M. vittatus* (26.47%). Among the ectoparasites, *Ichthyoptherius* is the most prevalent ectoparasites followed by *Trichodina* and *Myxobolus* (Table 3). The result of the present investigation correlated with the finding of other researchers (Kabata, 1985; Mukherjee *et al*., 2019). The minor difference may be due to the environmental and ecological situation of the fishes as well as parasites. The prevalence, intensity and density of parasites depends on many factors such as nature of parasites and its life cycle, host, feeding habits and the physico-chemical factors of water body where the fish inhabited. Ectoparasitic prevalence increases when water temperature and hardness decreases. The optimum levels of dissolved oxygen and neutral pH have a positive effect on the prevalence of ectoparasites (Mortuza & Al-Misned, 2015). Due to the presence of these parasites, the physiological activities of the host fishes are hindered and their developmental growth is retarded which cause economic loss to the fishery industry and piscine culture (Prakash & Verma, 2020).

CONCLUSION

The result of present study indicated that the prevalence, intensity and density of infection of protozoan parasite were highest in *W. attu* followed by *C. batrachus*, *H. fossilis* and *M. vittatus*. At present, India holds second rank in inland fish production in the world, therefore if we are not aware to the mortality caused by parasitic infection; it may cause the serious loss in fish production. It is, therefore, this problem assumes importance and needs further research work on the study of protozoan infection in different ecological situations which assist in protection of fish fauna. More in depth research is needed to be carried out for studying on parasites diseases of fishes and its relations to abiotic and biotic factors.

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