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Research paper

Prevalence of Trematode Infection and its Effect in the Fish, *Channa punctatus* (Bloch, 1793)

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ABSTRACT

The present study was conducted with the aim to observe the prevalence of infection and histopathalogical changes in infected organs of fish *Channa punctatus* (Bloch, 1793). During the study period (January 2019 to December 2019), the fish sample were collected from two riverine systems i.e. Bhagirathi (Tehri) and Ganga (Rishikesh). The transverse section (T.S) of liver indicates flattened and cuboidal cells without any definite boundaries. Plug-like projections are visible in the intestinal villi. Further, necrosis and ulceration are also observed in the mucosa of intestine at various places. Prevalence of infection was found highest in the month of July (22.72 %) followed by June (20.00 %) with least prevalence of infection in the month of December (8.33 %).

1. Introduction

Fish forms an important source of food not only in India but throughout the globe (Hasselberg et. al., 2020). There had been large increase in the development of fish farming (Ayoola, 2010) and culture attributable to the increased need for animal protein (Ramanathan et al., 2020). Parasites are a major concern to freshwater and marine fishes all over the world (Piasecki et al., 2004; Iyaji & Eyo, 2008; Bichi & Dawaki, 2010; Ekanem et al., 2011). Helminth parasites cause acute pathogenicity to the host fish (Kennedy, 2007). The fishes of Garhwal riverine ecosystem are famous throughout the country and most of the people like the cold-water fishes which is the specialty of this region (Dobriyal, 1991).

For the development of inland fisheries in Uttarakhand state, it becomes essential to make a systematic assessment of the role of helminths as potential pathogens in the fishery management. Therefore, a survey of trematode parasites was undertaken with a view to collect data on the helminthiasis which could be associated with diseases and health status of fishes.

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2. Materials And Methods

The fish samples were collected from from two riverine systems i.e. Bhagirathi (Tehri) and Ganga (Rishikesh). The intestine and liver of fish were examined for parasites as per the method adopted by Khan et. al. (2019). All the collected parasites were transferred to petri dishes containing 0.7% physiological saline. The content of the petridish was thoroughly examined and the flukes escaping into the physiological saline were collected using a micro dropper.

To study the histopathological changes in the organs of the infected fishes (*Channa punctatus*), the parasites along with infected organs (intestine and liver) were fixed in Bouin's fluid for 6-12 hours. The fixed infected and uninfected organs were washed with 70% alcohol and processed for microtomy.

$$\text{Prevalence (\%)} = \frac{\text{Number of parasites}}{\text{Number of fish examined}}$$

3. Result and Discussion

Helminth parasites observed were trematodes collected from the intestine of *Channa punctatus*. During the experimental period (January 2019 to December 2019), 200 samples were collected and examined. Out of 200 samples only 30 were infected. Monthly prevalence of infection was also recorded (Table 1).

The present results indicate that *C. punctatus* was infected by fluke parasite, *Gangatrema chandrai* (Trematoda: Opecoelidae, Plagioporinae). The fluke was found localized in the lower half of the stomach of the fish by its oral and ventral sucker. Further, it was observed that the plugs like projections of the mucosa are possibly formed by the suction this fluke (Fig. 1). Pronounced desquamation and ulceration of the epithelium have been seen at the site of attachment of the fluke. This is possible due to strangulation and subsequent necrosis of plug-like projection of the host intestinal wall by the parasite (Fig. 2). the transverse section (T.S.) of liver shows that cells have become flattened or cuboidal without any definite boundary. The nuclei have been shifted to the center of upper half of the cells (Fig. 3).

In the infected fish (*C. punctatus*), the submucosa was completely damaged and vacuolated and presence of fluke was seen in these spaces. In some places, many eosinophils and lymphocytes were observed whereas; at other places they were completely encapsulated. The capsule around the fluke is made up of fibrous connective tissue and the fibers stain blue with Mallory's triple stain.

In the infected fish sample (*C. punctatus*), there is oedema of sub mucosa and the blood supply of the area has been increased. There is vasodilation and the blood capillaries are congested in these fishes (Fig. 1, 2, 3). Cyst of fluke was also seen in liver (Fig. 3). Similar trends were observed by Beneerjee et al. (2016; 2019). Bose and Sinha (1979) observed histopathological changes in *channa gachua* infected by trematodes. Present, studies are in agreement with Reddy and Benarjee (2014).

Prevalence of infection was (22.72%) highest in the month of July followed by June (20.00) (Table 1). However, minimum prevalence (8.33%) of infection was observed in December (Table 1). Earlier, Shafaquat et al. (2020) also observed highest prevalence of trematodes in the month of July (45.45%) and lowest prevalence in the month of December (3.33%) in Kashmir.

Table 1 Month wise Prevalence of Infection (January to December 2019)

Month	No. of fishes examined	No. of fishes infected	Prevalence of infection
January	12	1	8.33
February	11	1	9.09
March	11	2	14.28
April	16	2	12.50
May	21	3	14.28
June	20	4	20.00
July	22	5	22.72
August	22	4	18.18
September	20	3	15.00
October	17	2	11.76
November	14	2	14.28
December	11	1	9.09
Total	**200**	**30**	**169.51**
Mean	**16.66**	**25**	**14.12**

Fig. 1 T.S. of the intestine of *Channa punctatus* infected with *Gangatrema chandrai*

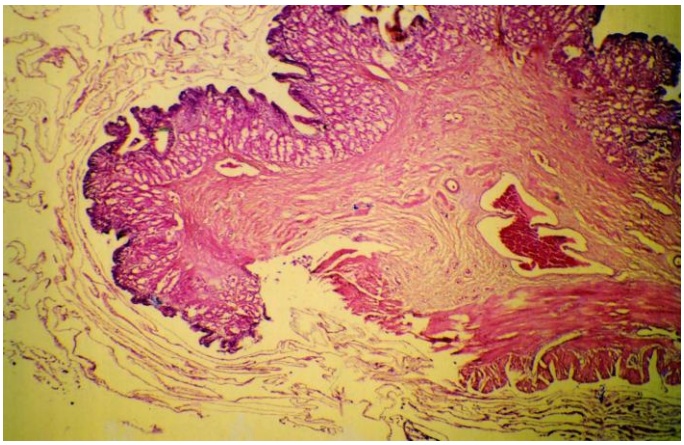

Fig. 2 T.S. of the infected intestine of *Channa punctatus* showing cyst formation of *Gangatrema chandrai*

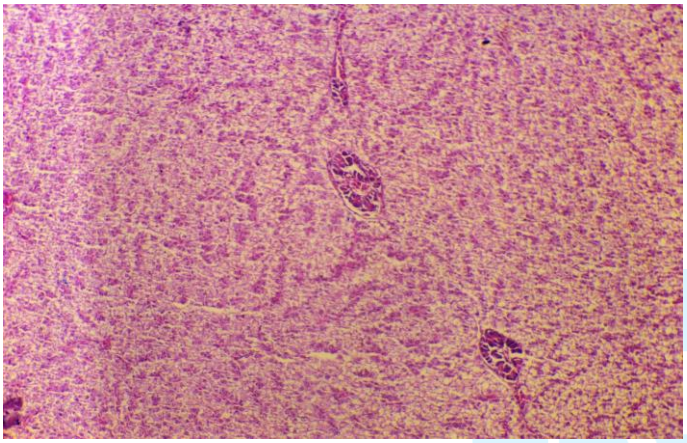

Fig. 3 T.S. of the infected portion of wall of liver of *Channa punctatus* by the parasite *Gangatrema chandrai*

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Declaration of Conflict

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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