



Helminth infection in coldwater fishes of Suru river Ladakh, Jammu and Kashmir, India

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Abstract

A helminthological survey of coldwater fishes of Ladakh was carried out from November 2007 to April 2009 (18 months). A total of 93 fishes belonging to two species viz., *Schizothorax plagiostomus* and *Diptychus maculatus* were collected and examined from different collection sites of Suru river, Kargil. A total of 2 helminth species viz., *Neoechinorhynchus yalei* Datta, 1936 and *Rhabdochona himalayai* Fotedar & Dhar, 1977 belonging to two helminth groups, i.e. Acanthocephala and Nematode were reported. It was found that out of 93 hosts examined, 31 were found infected with 43 parasites recovered in total, with an overall prevalence, mean intensity and abundance of 33.33%, 1.38 and 0.46 respectively. Distribution of helminth infection and its relation with sex and size of host was analysed. The helminth infection showed no significant relationship with sex of hosts however it showed mostly significant relation to size of host.

Keywords: Coldwater fish, helminth, Nematode, Acanthocephala, prevalence, Suru river.

INTRODUCTION

The ichthyofauna of Ladakh has been studied by various workers (Day, 1878; Jhingran, 1991; Jayaram, 1999). As far as the recent published reports are concerned, Sivakumar (2002) studied lotic fish fauna of Ladakh and reported 32 species of fishes while as Bhat *et al.* (2006) who studied indigenous fish fauna of this region reported only 10 species. Out of these fishes two species viz., *Schizothorax plagiostomus* and *Diptychus maculatus* were selected for present examination. These have been studied extensively for helminth infection especially in Kashmir valley (Datta, 1936; Pande 1938; Kaw, 1950; Fotedar and Dhar 1977; Dhar and Kharoo 1984; Chishti and Ahmed 2004; Ahmed and Chishti, 1994 and 2000) but no published reports of helminth infection were found by authors relating to this region which made the base for present investigation.

MATERIALS AND METHODS

Ladakh – the cold desert, represents the Trans-Himalayas sector of the Himalayan mountain chain (79°27'16" to 79°26'01" E and 34°35'37" to 35°24'33" N). It covers a total area of 96,701 sq. kms, divided politically into two districts viz., Kargil and Leh, comprising a population of about 2 lacs, making it one of the *highest habitable place* in the world with *lowest density* of human population.

The present work was carried out in District Kargil around the Suru river. A total of ninety three (n=93) fishes belonging to two species viz., *Schizothorax plagiostomus* and *Diptychus maculatus*, were collected and examined for helminth infection from different

collection sites of Suru river, Kargil. The fish specimen were measured (standard length (cm) and sexes were also determined.

During the dissection, skin, fins, gill filaments, eyes and intestine were examined in separate petri dishes with physiological saline solution (0.65). The Acantho collected were washed in normal saline, fixed in Carnoy's fluid and stained in aceto-alum-carmin. Nematodes were fixed in hot 70% alcohol, cleared in lactophenol and mounted in glycerine jelly. Measurements were taken with micrometer and expressed in mm. The parasites were identified using Yamaguti (1961), Cheng (1973) and Paperna (1996). For prevalence, intensity and abundance, the nomenclature given by Bush *et al.*, 1997 was followed. Chi square test was used. Significance was taken at $p < 0.05$.

RESULTS

During the present investigation two helminth parasites viz., *Neoechinorhynchus yalei* Datta, 1936 and *Rhabdochona himalayai* Fotedar & Dhar, 1977 belonging to two helminth groups, i.e. Acanthocephala and Nematode were reported from two species of fishes examined viz., *Schizothorax plagiostomus* and *Diptychus maculatus* respectively.

It was found that out of 93 hosts examined 31 were found infected with an overall prevalence of 33.3. Out of the 31 infected fishes, 43 parasites were recovered with mean intensity of 1.38 and abundance of 0.46 (Table 1).

Table 1. Infection level of different species of fishes examined

Host Species	FE	FI	NP	P (%)	MI	A
<i>Schizothorax plagiostomus</i>	48	19	26	39.58	1.36	0.54
<i>Diptychus maculatus</i>	45	12	17	26.66	1.41	0.37
Total	93	31	43	33.33	1.38	0.46

FE (number of fishes examined); FI (Number of fishes infected); NP (number of parasites recovered); P (Prevalence); MI (Mean Intensity); A (Abundance).

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Sex wise infection

In each fish species both male and female specimens were analyzed separately and the infection level was checked (Table 2).

The helminth infection in relation to sex of host was analyzed.

Table 2. Sex wise prevalence, intensity and abundance of helminth parasites in three species of fishes.

Host	Parameter	Male	Female	Total	Chi Square (χ^2)
<i>Schizothorax plagiostomus</i>	FE	20	28	48	$\chi^2=0.47$, df=1, p<0.05
	FI	08	11	19	
	NP	10	16	26	
	Prevalance (%)	40	39.28	39.58	
	Mean Intensity	1.25	1.45	1.36	
	Abundance	0.5	0.57	0.54	
<i>Diptychus maculatus</i>	FE	19	26	45	$\chi^2=1.33$, df=1, p<0.05
	FI	4	8	12	
	NP	6	11	17	
	Prevalance (%)	21.05	30.76	26.66	
	Mean Intensity	1.5	1.37	1.41	
	Abundance	0.31	0.42	0.46	

FE (number of fishes examined); FI (Number of fishes infected); NP (number of parasites recovered)

Table 2 shows the prevalence, intensity and abundance of helminth infection in relation to sex of fish species observed. In case of *Schizothorax plagiostomus* out of total 48 specimens observed, 20 male specimens were examined and 8 were found infected with a prevalence, mean intensity and abundance of 40%, 1.25 and 0.5 respectively. On the other hand 28 female specimens were examined and 11 were found infected with a prevalence, mean intensity and abundance of 39.28%, 1.45 and 0.57 respectively. Although the infection rate varied in different sexes but the calculated Chi Square value ($\chi^2 = 0.47$) was found lower than the tabulated value which indicated that there is no significant relationship between helminth infection and the sex of host. Similarly in case of *Diptychus maculatus*, out of total 45 specimens observed, 19 male specimens were examined and 4 were found infected with a prevalence, mean intensity and abundance of 21.05%, 1.5 and 0.31 respectively. On

the other hand 26 female specimens were examined and 8 were found infected with a prevalence, mean intensity and abundance of 30.76%, 1.37 and 0.42 respectively. Although the infection rate varied in different sexes but the calculated Chi Square value ($\chi^2 = 1.33$) was found lower than the tabulated value which indicated that there is no significant relationship between helminth infection and the sex of host.

Length wise infection

The helminth infection in relation to size of host was analyzed. The fishes were selected between the length groups of 10 to 30cm, the range in which infection was found. The fishes both <10cm and >30cm were found to have less or zero infection and thus were not included for the study.

Table 3. Length wise prevalence of helminth parasites in three species of fishes.

Host	Parameter	10–15	16–20	21–25	26–30	Total	Chi Square (χ^2)
<i>Schizothorax plagiostomus</i>	FE	9	12	22	5	48	$\chi^2=17.42$, df=3, p<0.05
	FI	2	5	12	0	19	
	Prevalance	22.22	41.66	54.54	0	39.58	
<i>Diptychus maculatus</i>	FE	11	10	24	-	45	$\chi^2=6.5$, df=2, p<0.05
	FI	0	5	7	-	12	
	Prevalance	0	50	29.16	-	26.66	

FE (number of fishes examined); FI (Number of fishes infected).

The table 3 illustrates size related variations in the infection of *Schizothorax plagiostomus*. The prevalence of infection among the different length groups varied significantly ($\chi^2 = 17.42$). The highest prevalence (54.54%) was recorded in length group 21 – 25 cm while as the lowest prevalence (22.22%) was recorded in length group 10 – 15cm. Also in case of *Diptychus maculatus*, prevalence of infection among the different length groups varied significantly ($\chi^2 = 6.5$). The highest prevalence (50%) was recorded in length group 16-20 cm while as the lowest prevalence (0%) was recorded in length group 10 – 15cm.

DISCUSSION

The various studies revealed that parasitic infections some

times correlate (Olofintoye, 2006) and sometimes does not (Chappell, 1969), Arme and Halton (1972), Barse, (1998), Akinsanya *et al.* (2007)) with sex of fishes. The present observations revealed that the prevalence of helminth infection in fish species examined does not show much difference and there was no significant relationship between sex of hosts and helminth infection. These observations are in conformity with Chappell (1969), Arme and Halton (1972), Barse, (1998) and Akinsanya *et al.* (2007).

The prevalence of parasitic infections correlate with fish length which also in turn corresponds to fish age as reported by Lagler *et al.* (1979). Tables 3 reveals that prevalence of helminth infection in fish species examined increases with their standard length from 0.0% prevalence of infection of 10 – 15cm (*Diptychus*

maculatus) in standard length to 50% and 54.54% prevalence of infection of 16 – 20cm (*Diptychus maculatus*) and 21-25cm (*Schizothorax plagiostomus*) in standard length respectively and then decreases to 0.0% of 26 – 30cm (both) in standard length.

The prevalence of infection among the different length groups varied significantly. These observations are in conformity with findings of Read *et al.*, 1967 who observed that the probable reason for difference in prevalence of infection between the juvenile and the adult fish as related to their standard length may be due to change in diet from weeds, seeds, phytoplanktons and zooplanktons to insect larvae, snails, crustaceans, worms and fish in both juveniles and adulthood respectively. The higher length groups recorded decreased prevalence of infection both species). This may be attributed to the possible random selection of the specimens and the possible high level of immunity in larger sized fish specimens as observed by Akinsanya *et al.*, 2007.

The high incidence of infestation obtained in adult fish is an indicator that size of the fish is important in determining the parasite load compared to juveniles. Geets and Ollevier (1996), Oniye and Aken'Ova (1999) also reported that increase in the abundance of parasites with host size. Anosike *et al.* (1992) reported that number of parasites and its diversity increase with age of fish. Mohammed *et al.* (2009) reported prevalence was found to increase as the fish grows, and that could be attributed to the longer time of expose to the environment by body size.

CONCLUSION

The present work reveals that the helminth infection shows no relation to sex of host while as significant relationship was observed with size of host.

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