

A Comparative Study of Parasites Infecting Some Selected Fishes from the Water Bodies of Kashmir Valley

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ABSTRACT

An investigation of Helminth parasites of *Schizothorax* (Native fish) and *Cyprinus carpio* (Exotic fish) collected from Dal Lake and River Jhelum was undertaken for a period of one year from March, 2008 to February, 2009. Out of 400 fishes collected equally throughout the year, a marked helminth infestation was observed in *Schizothorax* in comparison to *Cyprinus carpio* which showed a little trematode infection during the entire period of study. Species of *Schizothorax* were found to be abundantly infested with acanthocephalans followed by cestodes and trematodes. However, no infestation of cestodes and acanthocephalans was observed in *Cyprinus carpio*, indicating the susceptible nature of the *Schizothorax* species to helminth infestation. From the present study, it may be inferred that the susceptibility of *Schizothorax* species to helminth infestation may be considered as one of the factors responsible for the decline of this native fish from the water bodies of Kashmir valley.

Key Words: Helminth, *Schizothorax*, *Cyprinus carpio*, Dal Lake, River Jhelum

INTRODUCTION

Fish, the poor man's protein being low in cholesterol, forms an important source of diet and are easily accessible to the people especially that of rural areas of Kashmir. They contribute a lot to the economy especially in Kashmir where there is abundance of freshwater reservoirs and perennial rivers. It is estimated that about 10 million tons of fish is required annually to meet the present day demand of fish protein in the Country against an annual production of only 3.5 million tons (Shukla and Upadhyay, 1998).

The natives of Kashmir valley divide all types of fishes broadly into two categories of local (Kashmiri) and non-local (Punjabi) fish, zoologically known as endemic and exotic fish species respectively. The fish population especially the local fish *Schizothorax* has been experiencing a continuous and considerable reduction both in Dal lake and river Jhelum over the last decade (Department of Fisheries, Kashmir, 2004-2005; Rukhsana et al., 2008). The species being sensitive cannot withstand unclear waters. Since the water quality in the river and lake has deteriorated over the years, the *Schizothorax* finds it difficult to thrive in water with depleted oxygen levels (Hussain et al., 2003).

Fish harbor a variety of parasites viz., protozoa, cestodes, trematodes and acanthocephalans (Ali, 1990) and the degree of damage by infection is influenced to a large extent by the type and numbers of parasites present (Bauer, 1941). The distribution of parasites varies not

only in different species of fish but also seasonally and from one water body to other. The pathogenicity of parasitism has been reported to cause extensive damage to the host leading to the lower production of the fish (Rai, 1986). In certain studies the parasite has been found to be responsible for the death of the host (Bookmer et al., 1981). Present study was designed to make a comparative survey for the parasitic infections, including their identification, their prevalent frequencies, mean intensity and host specificity with regard to *Schizothorax* species and *Cyprinus carpio* in the Dal Lake and River Jhelum of Kashmir Valley.

MATERIALS AND METHODS

Study Area

The study area for collection of fish hosts was river Jhelum and Dal Lake. The fish were collected at different reference points with the help of local experienced fishermen using Cost Net or Khuri. After random collection at different sites of the study areas, the fish hosts were brought to the laboratory in containers for identification and subsequent collection of helminth parasites.

Fish Measurement

The total length (TL) of the fish hosts were measured from the tip of the snout to the end of the caudal fin with the lobes folded.

Collection and Identification of Parasites

For parasitic observation, initially the entire outer surface

Table 1. Total Length of fishes with prevalence, Mean Intensity and Relative Density of Helminth Infections Recorded from River Jhelum and Dal lake.

Fish Species	Total Length (cm)	Total No. of Fish Examined	River Jhelum			Dal Lake			Total No. of Parasites	Prevalence	Relative Density	Mean Intensity
			No. of Fish Examined	No. Infected	No. of Parasites	No. of Fish Examined	No. Infected	No. of Parasites				
<i>Schizothorax niger</i>	21.5-27.5	34	13	1	8	21	4	26	34	14.70	1	6.8
<i>S. plagiostomum</i>	22.5-28.5	25	15	2	12	10	2	25	37	8	1.48	9.25
<i>S. curvifrons</i>	35.1-45.1	40	25	4	27	15	5	78	105	22.5	2.62	21
<i>S. esocinus</i>	32.1-40.2	62	32	3	20	30	4	29	49	11.29	0.79	7
<i>S. labiatus</i>	20.0-31.1	39	29	2	14	10	3	32	46	12.82	1.17	9.2
<i>Cyprinus carpio specularis</i>	13.9-27.6	75	50	1	7	25	4	21	28	6.66	0.37	5.6
<i>C. C. communis</i>	38.0-46.0	125	75	3	18	50	6	32	50	7.2	0.4	5.5

Table 2. Prevalence of Parasites in Fish Hosts.

Fish Species	No. of Infected Fishes	Trematodes		Acanthocephalans		Cestodes	
		<i>Diplozoan</i>	<i>Clinostomum</i>	<i>Pomphorhynchus</i>	<i>Neoechinorhynchus</i>	<i>Adenoscolex</i>	<i>Bothriocephalus</i>
<i>Schizothorax niger</i>	5	-	-	15	5	14	-
<i>S. plagiostomum</i>	4	3	-	24	10	-	-
<i>S. curvifrons</i>	9	4	2	43	9	42	15
<i>S. esocinus</i>	7	8	2	10	18	10	1
<i>S. labiatus</i>	5	-	-	18	11	12	5
<i>C. C. specularis</i>	5	16	12	-	-	-	-
<i>C. C. communis</i>	9	40	10	-	-	-	-

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especially the gills and the opercula were carefully searched for monogenetic flukes. The hosts were then directly dissected midventrally and the body cavities were scanned for the endoparasites. The gills and viscera were kept separately in petridishes containing normal saline. Gills were teased with fine needles and examined for the parasites. The viscera too were examined for the endohelminth parasites.

The parasites collected were transferred to normal saline and counted in the living state. Using the methodology of Weesner (1968), the parasites were processed and identified with the help of keys provided by Yamaguti (1963) and Manwell (1961). The prevalence, mean intensity and relative density of helminth parasites were calculated in accordance with that of Margolis *et al.*, (1982).

RESULTS

During the entire period of study a total of 349 parasites were recovered from 400 fish species of *Schizothorax* and *Cyprinus carpio*. Out of this total infection 271 parasites were recovered from fish species of *Schizothorax* as compared to *Cyprinus carpio* where in a total number of 78 parasites were collected. The varied degree of helminth infection and the comparative individual parasitic infection along with the length of the hosts is shown in Table 1 and Table 2.

Further, among trematodes, *Diplozoan* showed the highest number followed by *Clinostomum*. Similarly, *Pomphorhynchus* outnumbered the *Neoechinorhynchus* in case of acanthocephalans. However, no infection of acanthocephalans was found in case of *Cyprinus* species. Among cestodes *adenoscolex* showed higher number than *Bothriocephalus* in case of *Schizothorax species*. Again, no cestodes infection was found in *Cyprinus species*.

DISCUSSION

In the present research work, the comparative helminth study showed the highest prevalence of parasites in case of *Schizothorax species* when compared to *Cyprinus species*. The comparative differences in parasitism can be attributed to the different preferences for food, length and the resistance of the host. Jan and Das (1970) categorized species of *Schizothorax* as herbivorous fishes, for most of their food (65-70%) consisted of phytoplankton and rest contained aquatic invertebrates, thereby determining the amount of intake of the intermediate host.

In the present investigation the length of the host was found affecting the prevalence and mean number of

parasites per host. Hine and Kennedy (1974) have found an increase in mean worm burden with an increase in fish length. Amin (1986) has observed varying results in the parasitic abundance in different length groups of fish, which he attributed to the changes in the feeding at different ages of the host. During the entire period of study, the highest prevalence of acanthocephalans was observed in case of *Schizothorax species* which is inconsonance with the earlier findings (Amin, 1968; Chishti and Peerzada, 1998) and can be linked with many ecological factors including feeding behavior, diet of the host and water temperature (Tedla and Fernando, 1969). Among acanthocephalans, the highest number of *Pomphorhynchus* observed in the study can be attributed to its wide host range (Chishti and Peerzada, 1998).

The comparative difference of parasitism observed in the *Cyprinus Species* in the present investigation may also suggest the parasitic resistance of the exotic host (karvonen *et al.*, 2003) which may be associated with the physiology identified by the presence of both specific and non-specific immune responses to the infection (Bortz *et al.*, 1984). Worldwide studies have shown the impact of exotic fish on the native fish with regard to parasitism and concluded that transfer of parasites from the exotic to the native fishes can have severe consequences (Dove, 1998). Further, the richness of helminth infracommunity species observed in the native fish from the Little Colorado River (Choudhry *et al.*, 2004) support our findings.

As reported earlier (Sures, 2004), the incidence of helminth parasites observed in the present study present a review in monitoring water pollution of these water bodies. Thus, it can be proposed that the pollution of water bodies have led to the parasitic infestation of the host and subsequently affected the growth, development and survival of this native fish.

Since the present investigation is not sufficient to determine the possible cause of decline of the native fish by comparing the prevalence of parasitic infection in the two different hosts of *Schizothorax* and *Cyprinus carpio*. It needs comprehensive physiological and immunological studies. Therefore, authors suggest a comprehensive research in the identification of other factors being responsible for the decline of this economically important native fish of the Kashmir Valley.

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