

A Comparative Study of Parasites Infecting Some fishes of Shallabugh Wetland, Kashmir

Ibraq Khurshid, Fayaz Ahmad and Tanveer A. Sofi.

Post Graduate Department of Zoology
University of Kashmir, Srinagar-190 006, Kashmir
kibraq@yahoo.com

Abstract: An investigation of Helminth parasites of *Schizothorax* (Native fish) and *Cyprinus carpio* (Exotic fish) collected from Shallabugh Wetland was undertaken for a period of one year from August 2010 to July 2011. Out of 486 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 trematodes followed by Cestodes and Acanthocephala. However, less infestation of trematodes, 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.

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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 (Bookmeret et al., 1981). Present study was designed to make a comparative survey for the parasitic infections, including their identification, their prevalent frequencies and host specificity with regard to *Schizothorax* species and *Cyprinus carpio* in the Shallabugh Wetland.

Material and Method

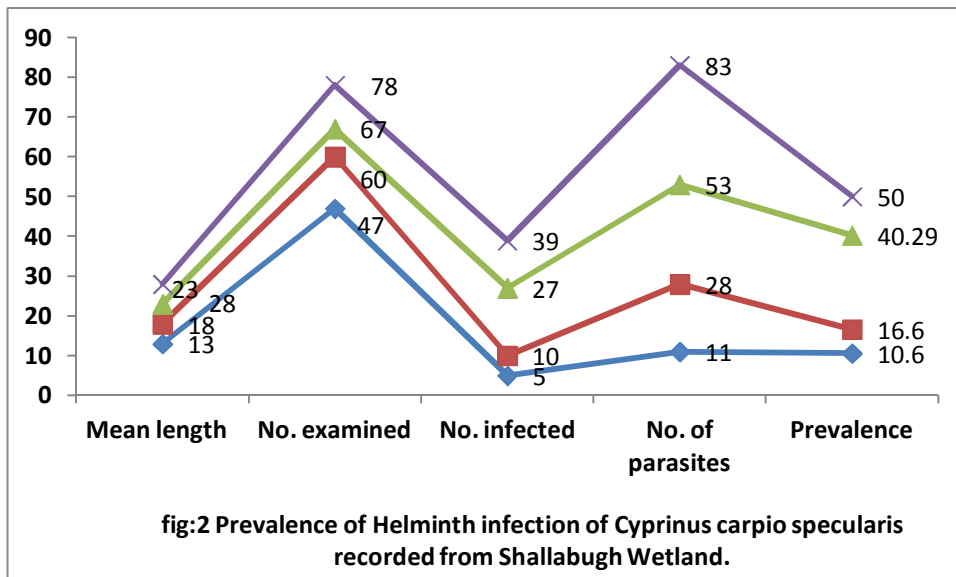
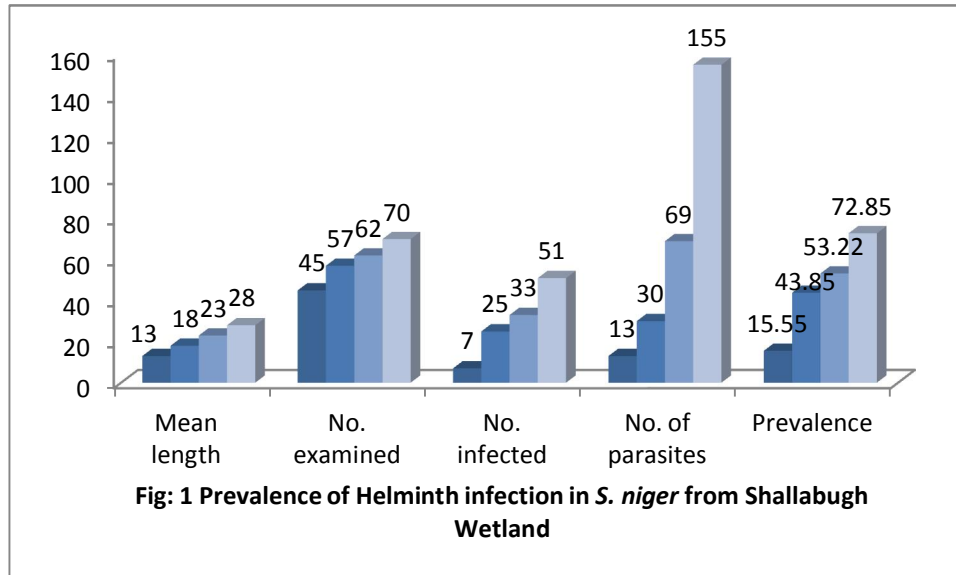
Fishes used for the study were bought from same fisherman operating with gill nets and cast nets. The fish samples were kept in plastic coolers containing river water and ice blocks before being transported to the laboratory. In the laboratory the fishes were identified to species level using keys provided by Holden and Reed (1972) and Lowe-McConnel (1972). Fish standard length (SL – from the snout to the base of the caudal peduncle) were determined with a meter rule while body weight (BW) was determined using a weighing balance. The gills, muscles, intestine, stomach and oesophagus of the fish were examined for parasites. Parasites recovered from each site were properly washed, fixed in alcohol-formol-acetic acid according to Olurin and Somorin (2006) and site of infection noted. Identification of parasites was carried out according to Yamaguti (1958, 1959, 1961 and 1963).

RESULTS

During the entire period of study a total of 234 *Schizothorax nigers* specimens and 252 *Cyprinus*

carpio specimens were examined. Out of 234 *Schizothorax niger* and 252 *Cyprinus carpio* specimens 116 and 81 were infected respectively. 267 parasites were recovered from 116 *Schizothorax niger* and 175

parasites were recovered from 81 *Cyprinus carpio*. The varied degree of helminth infection and the comparative individual parasitic infection along with the length of the hosts is shown in Table 1, 2, 3 and 4.



Length	No. examined	No. infected	No. of parasites	Prevalence
10.5-15.5	45	7	13	15.55
15.5-20.5	57	25	30	43.85
20.5-25.5	62	33	69	53.22
25.5-30.5	70	51	155	72.85

DF = 6, P-Value = 0.031

Host	Mean length (c ₁)	No. of parasites(c ₂)
<i>S. niger</i>	13	13
<i>S. niger</i>	18	30
<i>S. niger</i>	23	69
<i>S. niger</i>	28	155

DF = 3, P-Value = 0.031, Correlation of C1 and C2 = 0.9

Length	No. examined	No. infected	No. of parasites	Prevalence
10.5-15.5	47	5	11	10.6
15.5-20.5	60	10	28	16.6
20.5-25.5	67	27	53	40.29
25.5-30.5	78	39	83	50.0

DF = 9, P-Value = 0.013

Host	Mean length (c ₁)	No. of parasites(c ₂)
<i>S. niger</i>	13	11
<i>S. niger</i>	18	28
<i>S. niger</i>	23	53
<i>S. niger</i>	28	83

DF = 3, P-Value = 0.013, Correlation of C1 and C2 = 0.9

Fish	Total No. infected	Trematode		Cestode		Acanthocephala
		<i>Diplozo-on</i>	<i>Clinosto-mum</i>	<i>Adenos-colex</i>	<i>Bothrioceph-lus</i>	<i>Pomphor-ynchus</i>
<i>Schizothorax niger</i>	116	79	50	26	63	49
<i>Cyprinus carpio specularis</i>	81	39	27	35	45	29

r = 1.000 (highly +vely correlated)

During the entire period of study a total of 442 parasites were recovered from 486 fish (*Schizothorax* and *Cyprinus carpio*). Out of this total infection 267 parasites were recovered from *Schizothorax* as compared to *Cyprinus carpio* where in a total numbers of 175 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 fig 1 and 2.

Further, among trematodes, *Diplozoan* showed the highest number followed by *Clinostomum*. *Pomphorhynchus* was found only in case of acanthocephalans. Among cestodes *Bothriocephalus* showed higher number than *adenoscolex*

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 trematodes 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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Corresponding Author:

Ibraq Khurshid
Department of Zoology
University of Kashmir
Email: kibraq@yahoo.com

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