

Parasitic distribution in relation to gender, season and length of fish hosts in Shallabugh wetland.

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Abstract

Parasitism is of great interest to the ecologists because it poses great problem in the growth of the fish hosts. With the aim to evaluate the relationship between the infection levels, length of fish host, gender and season, the present study was undertaken on Shallabugh wetland for a period of one year from August 2011 to July 2012. This Wetland consists of larger area of riverine marshes and shallow fresh water with associated reed-beds on the floodplains of river Jhelum. The Wetland together with marshes is fed by the Anchar Lake and local runoff. The average depth of the water varies from 0.3 to 2.0 meters. The Wetland supports a locally important fishery and reed harvesting Industry, which provides excellent opportunities for sport Hunting. During the study period, 342 fish specimens belonging to the genus *Schizothorax* were examined from three collection sites in the wetland. The collection sites were inlet (where the anchar lake meets the Shallabugh wetland), middle of the Shallabugh wetland and third is the outlet (where the shallabugh wetland meets river jhelum). Out of 342 specimens 120 were taken from inlet, 113 from middle and 109 from outlet. A total of 106 specimens were infected (52 at inlet, 25 at middle and 29 at outlet) showing the intra wetland variations of 43.33% (inlet), 22.12% (middle) and 26.6% (outlet). Our results show that the prevalence of infection increased significantly with increase in the length of host ($r = 0.968$). Season wise distribution also showed the +ve correlation (chi-square = 43.560) , ($p = 0.001$) and furthermore the gender showed the -ve correlation with the prevalence of infection as the male and female host specimens were equally prone to the helminth infection.

Key words: Fish; Parasite; Helminth; *Schizothorax* spp., Wetland; Kashmir.

Introduction

About 46 spp. of helminths are reported as parasites of fresh water fishes of Kashmir as far the knowledge of the author is concerned. They belong to four groups, cestodes (6sps.), trematodes (20sps.), nematodes (5sps.) and acanthocephala (15sps.). These helminth parasites may infect several hosts from different families (Poulin 1992). In

the past researchers have studied some of the ecological aspects of the helminth parasites in this region like season influencing the helminth parasites (Chishti *et al.*, 2000 ; Zargar *et al.*.,2012). However previous studies have not used the holistic approach to ascertain the effect of various factors which influence infection level of helminth parasites in the Kashmir Himalayas. In order to unravel the effect of various factors like seasonality, gender, length of the host, we carried out the investigation in Shallabugh Wetland.

Hypothesis

It was predicted that gender, seasonality and length could affect the helminth infection.

Material and method

3.1 Study site:

Shallabugh wetland is 16 km northwest of Srinagar and measures about 12 square kilometres. The Wetland consists of larger area of riverine marshes and shallow fresh water with associated reed-beds on the floodplains of river Jhelum. The Wetland together with marshes is fed by the Anchar Lake and local runoff. The average depth of the water varies from 0.3 to 2.0 meters. The Wetland supports a locally important fishery and reed harvesting Industry, which provides excellent opportunities for sport Hunting.

3.2 Host and parasite collection

The present study was carried out between August 2011 to July 2012. In total 342 (143 *S. plagiostomus*, 55 *S. curvifrons*, 77 *S. esocinus*, 67 *S. labiatus*) individuals of Schizothorax species were examined. Fishes were caught by local fisherman using nets. Further investigation was carried out in the laboratory, where total length, standard length, body weight and gender for each was determined. Biometrical indices like length weight relationship was calculated by Lecren's (1951) method ($W = aL^b$) and conditional factor by Fulton's index ($K = W/L^3 \times 10^5$).

Fish collected from Shallabugh wetland were immediately dissected and some fishes were kept alive in aquarium for short period of time (upto 2hr).so that they remain fresh for parasitological investigation. Gills, intestine were carefully removed soon after the death of fish and kept in a petridish containing normal saline (0.85%NaCl). For studying the micro distribution of some helminth parasites like

Diplozoon, *Pomphorhynchus*, the methodology of Turgut *et al* . (2006) and Geets *et al* (1997) were adopted.

3.3 Experimental Design

Three collection sites were selected for collection in Shallabugh wetland. One site is where the Anchar Lake meets the Shallabugh Wetland (inlet), second is the middle of Shallabugh Wetland and the third is the sangam (outlet).

3.4 Data Analysis

Pearsons correlation was used to asses association between different physic chemical features and helminth infection. Chisquare analysis was also used for calculating the prevalence of helminth infection and the relation between length and infection rate.

4. Results and discussion

4.1 Intra wetland variations

The results showed a significant difference between study sites in Shallabugh wetland ($p=0.008$). The prevalence was significantly higher at highly polluted site (prevalence = 45.8; $p < 0.05$) in comparison to eutrophic site (prevalence = 22.01; $p < 0.05$) in Shallabugh wetland (table 1).

Table:1 Intra wetland variations of parasitic infection in Shallabugh Wetland			
	Inlet	Middle	Outlet
Total no. examined	120	113	109
No. infected	52	25	29
Prevalence	43.33	22.12	26.6
No. of parasites	123	82	54
Mean intensity	2.36	3.28	1.87
P = 0.032			

Data showed the significant intra wetland variation in prevalence of helminth infection in fish hosts. Significantly low mean intensity at the polluted and hyper eutrophic site in Shallabugh wetland could be due to negative impact of contaminants on helminths itself and thus decreased intensity. It also seems that helminths show antagonistic response to combined effect of pollutant and eutrophication at this site.

4.2 Effect of month and season on the infection

The monthly prevalence showed insignificant differences ($p > 0.05$), whereas seasons showed significant differences in prevalence (Table 2; $p < 0.05$). Clear

seasonal trend was observed in Shallabugh Wetland with maximum infection level during summer months and least in winter months . The prevalence among different seasons when compared statistically revealed significant differences ($p < 0.05$).

Table: 2 Season wise prevalence of helminth infection in fish hosts			
Season	No. examined	Positive	Prevalence %
Spring	85	17	20
Summer	84	43	51.19
Autumn	95	36	37.89
Winter	78	10	12.8
Total	342	106	30.99
Chi-square = 43.560 p-value = 0.001			

The results showed significant seasonality in the helminth infection in Shallabugh wetland. The seasonality in our study is in conformity with the results of Yufa and Tingbao (2011) who concluded that the helminth species like monogenean showed seasonal alterations associated with environmental changes. The abrupt increase in helminth infection from winter in Shallabugh wetland could be due to increased duration of life of the infective larva, thereby assisting the transfer of helminth infection like Diplozoon infection from fish to fish (Chubb, 1979).

4.3 influence of gender and condition factor on the level of infection

In all the three study sites males and females are equally susceptible to infection ($p < 0.005$; Table 3).

Table 7. Gender Wise prevalence of Helminth parasites in Fishes					
Host	Gender	No. Examined	+ve	Prevalence (%)	P.value
<i>S. plagiostomus</i>	M	83	15	(18.0)	0.32
	F	60	16	(26.6)	
<i>S. labiatus</i>	M	42	14	(33.33)	0.7
	F	25	7	(28)	

<i>S.esocinu</i>	M	42	16	(38.09)	0.87
	F	31	11	(35.4)	
<i>S.curvifrons</i>	M	41	13	(31.7)	0.53
	F	58	14	(24.13)	

The present study showed insignificant relationship between gender and helminth infection, which is in accordance to the studies done by Peerzada and Chishti, (1999), who reported similar rates of infection in both the sexes. Condition coefficient was found to be lower in infected fish than in uninfected fish in Shallabugh wetland. It may be due to the fact that parasites decrease the immune system of the hosts, which may lead to decreased growth of fish. Decreased growth may lead to decrease in condition coefficient (Khan and Thulin, 1991; Poulin, 1992). Parasites may also alter the physiological as well as reproductive functions of hosts. This may also lead to decreased growth of fish (Le Cren, 1951). It has been reported previously that condition factor tend to be higher due to higher food quality and availability (Polacik *et al.*, 2009; Ondrackova *et al.*, 2009).

4.4 Prevalence, mean intensity in relation to length of host

Prevalence and mean intensity showed the +ve correlation with the length of host ($p > 0.005$; table 4).

Table 4.4 Prevalence, mean intensity in relation to length of host					
length	No.examined	No. infected	No.of parasites	Prevalence	Mean intensity
10.5-15.5	79	10	22	12.65	2.2
15.5-20.5	87	28	64	32.18	2.28
20.5-25.5	84	30	76	35.71	2.5
25.5-30.5	92	38	97	41.30	2.4
Total	342	106	259	30.46	2.44

This depicts that with increase in the host length the no. of parasites also increase.

5. Conclusions and suggestions

In summary, intra lake variation, season, condition factor and microhabitat seem to have a significant impact on the helminth infection. It also seems from the data that eutrophic and hypertrophic habitats were favourable for helminths. It is suggested that more field and in vitro studies need to be carried out to know the joint impact of pollution and eutrophication on the helminth infection. Present study will pave the way for future studies on different ecological aspects of helminth parasites in this region as well as in similar climatic regions of the world. Furthermore we need to unravel the specific factors which have major impact on the occurrence of helminths in this region. Helminths in particular should be integrated with bio monitoring programmes, as these parasites can provide supplementary information on pollution. It is also suggested that helminths in general should be analysed for accumulation capability of different contaminants under experimental conditions in order to validate the role of helminth parasites in environmental monitoring.

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