

OCCURRENCE OF ENDOPARASITES IN SOME SELECTED FISHES OF CHENAB RIVER, PAKISTAN

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Abstract: The current study was carried out to evaluate prevalence of endoparasites in freshwater fishes of Chenab River. The fish samples were collected from Chenab River during November 2014 to March 2015. In total, 285 fishes were examined for parasites, of which 75 fishes (26.1% of the total sample) were infected with parasites. Among the species, prevalence of infection was maximum in *Rita rita* (60%) and in *Labeo rohita* (37.5%). The minimum prevalence was, however, recorded in *Oreochromis aureus* (16.7%) and no parasite was found in *Mastacembatus armatus*. Among the organs, highest prevalence of endoparasites was observed in the intestine (43%) and gall bladder (33.2%). The prevalence of nematode and trematode was found higher (29 and 21%, respectively) in all fishes. It was revealed that the diversity of endoparasites in freshwater fishes is high. Since the use of fish as a ready source of food is increasing, therefore, the overall health status of fish in a system is becoming more valuable.

Key words: Endoparasites, freshwater fish, *Labeo rohita*, prevalence, *Rita rita*

INTRODUCTION

Fish is an important source of food that supplies low cholesterol protein to approximately 60% of the world population (Sichewo *et al.* 2013). Developing countries deriving approximately 30% of their annual animal protein requirements from fish (Abisoye *et al.* 2011). Both wild and farm fish are a potential host to various parasitic species that cause greater mortalities. It has been reported that at least one parasite is hosted by approximately 50 to 90% of freshwater fishes (Eissa *et al.* 2012). Losses resulting from these parasites are at high densities under existing conditions and, if left uncontrolled, may lead to catastrophic proportions (Abbas *et al.* 2014). The normal growth of fish is affected by parasites that lives on the fish if highly infested. Parasites not only effect the survival of fish directly by reduced condition (fish size), changing the behavior, further susceptible to infection (Thomas, 2014), but also lowered swimming ability, decrease their growth rate and increase mortalities (Piasecki

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et al. 2004). In crowded environments, the parasitic infections are considered a major problem (Van den Broek 1979). Parasites affects yield of various organs of fish including liver oils (Cross 1933). To prevent the negative effects of parasitic diseases, the precise identification of fish parasites is imperative.

Parasites, specially, occurring in freshwater fishes need serious consideration that contaminate economically imperative fish species that, in many cases, it decrease their quality and deliciousness (Okorie 1972). It is necessary to understand the mode of transmission and potential intermediate hosts to eradicate the problem (Goselle *et al.* 2008). Parasitism is most common and diverse in wild than in ponds, hatcheries and captivity. Infection in fishes occurs due to overcrowding and environmental stress (Thomas 2014). In Pakistan, fish culture has transformed into a main commercial activity during the last two decades. Intensification and expansion of fish culture is, however, facing severe threats from pathogens including parasites as they are one of the major causes for chronic mortalities and poor growth, affecting the yield and marketability of fishes.

Fish parasites may be transmitted through food, introduction of exotic species in aquatic ecosystem as well as handling and processing of the infected fish. Fish infections caused by endoparasitic helminths tends to increase with increased level of pollution (Palm 2011).

Fish become infected with parasites if they are nurtured live foods containing infective life stages that carry the infective stages of vector (Yanong 2011). Through variation in the aquatic environment, either environmental or anthropogenic, can alter host parasite balance and become source of disease or mortality in fishes. Fish parasites cause physiological, reproductive and physical damage to fishes (Iwanowicz 2011). The consumption of contaminated fish may lead to food borne illness (diarrhea and dysentery) resulting in great economic losses (Sichewo *et al.* 2013). Both ecto and endoparasites are common in fishes but endoparasites are more dangerous and cause extensive damage to their hosts (Ashraf and Zafar 2013). The awareness regarding numerous common fish parasites within a given fish population is necessary. The aim of the study is, therefore to identify and detect the endoparasites of freshwater fishes from Chenab River and to investigate the prevalence of endoparasites.

MATERIAL AND METHODS

A total of 285 fishes were randomly collected from two different location; Shershah Bridge and Head Muhammad Wala at Chenab River, Pakistan. Fishes were caught by using or through gillnets by local fisherman during November, 2014 to March, 2015. The samples were transported immediately to the

Parasitology Laboratory at Faculty of Veterinary Sciences, Bahauddin Zakariya University, Multan for further investigation of parasites.

Fishes were identified according to the method described by Mirza and Sandhu (2007). Weight and length of each fish were recorded. After removal of excess mucus, the samples were dissected by making an incision along the mid-ventral line by using scalpel, thumb forceps and sharp-blunt scissors. The endoparasites were collected from different locations including liver, intestine, gall bladder and stomach. After examining the external surface of each organ, the organ was dissected for further examination, was taken. A drop of water was placed in the middle of a clean and dry glass slide, free from scratches, and a small amount of sample material (intestine, liver, stomach or gall bladder) was added on it. The material was mixed with glass rod and spreaded thinly, thereafter, covered with a coverslip. The prepared slide was examined under microscope (Olympus) for parasite, their eggs or larvae.

Prevalence: Prevalence of endoparasites in freshwater fish was measured by following formulae.

$$\text{Prevalence (\%)} = \frac{\text{No. of infected fish}}{\text{Total No. of fish examined}} \times 100$$

RESULTS AND DISCUSSION

In total, 285 fish sample were collected from Chenab River. The collected fish samples included *Labeo rohita*, *Catla catla*, *Hypophthalmichthys molitrix*, *Rita rita*, *Ctenopharyngodon idella*, *Notopterus notopterus*, *Mastacembatus armatus*, *Channa punctata* and *Oreochromis aureus* species (Table 1). The parasites found in fish are shown in Table 1. A negative correlation was observed with the size of fish and prevalence of endoparasites. Maximum prevalence of endoparasite was recorded in *Rita rita* (60%) followed by *Labeo rohita* species with 37.5% (Table 1).

In total, 24 identified parasites belonging to 21 species, and eight classes including Trematoda, Nematoda, Conoidasida, Microsporidea, Cestoidea, Copepoda, Monogenea and Myxospora were recovered from the stomach, intestine, liver, and gall bladder. Among the parasitic classes, the highest prevalence of Nematoda (29%) followed by Trematoda (21%) was observed (Table 2).

In total, 285 fishes were investigated for endoparasites during the present study. The results indicated that 75 fishes (26.3% of the total sample) were infected with endoparasites. The highest incidence of endoparasites was observed in *Rita rita* (60%) and *Labeo rohita* (37.5%), whereas. the minimum prevalence was recorded in *Oreochromis aureus* (16.7%) and no parasite was

Table 1. Fish species examined for endoparasites, identified parasites and their percentage of prevalence

Species	No. of fish	BW ^a (g)	TL ^b (cm)	Identified parasites	Organ	No. of infected fish	Prevalence (%)
Silver carp <i>Hypophthalmichthys molitrix</i>	25	110	7.8	<i>Diplostomum spathaceum</i> , <i>Prostotocus mastacembeli</i>	Intestine	5	20
Grass carp <i>Ctenopharyngodon idella</i>	25	235.5	12.4	<i>Eustrongylides tubifex</i> , <i>Harpacticoid copepod</i> , <i>Diphyllbothrium latum</i>	Intestine, liver, gall bladder	5	20
Thaila <i>Catla catla</i>	60	176.6	11.4	<i>Diplozoön indicum</i> , <i>Diplostomum spathaceum</i>	Intestine, gall bladder	15	25
Rohu <i>Labeo rohita</i>	40	195	13	<i>Myxobolus</i>	Intestine, gall bladder	15	37.5
Daula <i>Channa punctata</i>	50	51.47	3.8	<i>Senga taunsaensis</i> , <i>Camallanus unispiculus</i> , Microsporidia, <i>Genarchopsis goppo</i> , Coccidia	Intestine, liver, gall bladder	10	20
Pari <i>Notopterus notopterus</i>	20	301.7	13.2	Coccidia, roundworm, <i>Dactylogyrus</i> sp.	Intestine, gall bladder, stomach	5	25
Tirkanda <i>Rita rita</i>	25	360.3	27	<i>Procammallanus heteropneustus</i> , <i>Rhabdochona magna</i> , <i>Capillaria pterophylli</i> , monogene (fluke)	Intestine, gall bladder, stomach	15	60
Tilapia <i>Oreochromis aureus</i>	30	111	12.5	<i>Fasciola hepatica</i>	Intestine	5	16.7
Gruij <i>Mastacembatus armatus</i>	10	71.6	13.3	-	Intestine, gall bladder, stomach	0	0
Total	285			24		75 (26.3%)	

^aAverage body weight: BW. ^bTotal length: TL.

found in *Mastacembatus armatus* (Table 1). Among the organs, the highest prevalence was observed in intestine (43% of the total identified parasites) and gall bladder (33.2% of the total parasites) of the examined freshwater fishes (Fig. 1).

Table 2. Prevalence of endoparasites with respect to their class in freshwater fish of Chenab River

Class	Parasites recovered	No. of parasites species	Prevalence (%)
Trematoda	<i>Genarchopsis goppo</i>	5	21
	<i>Diplostomum spathaceum</i>		
	<i>Prosotocus mastacembeli</i>		
	<i>Diplostomum spathaceum</i>		
	<i>Fasciola hepatica</i>		
	<i>Capillaria pterophylli</i>		
Nematoda	<i>Rhabdochona magna</i>	7	29
	<i>Procamallanus heteropneustus</i>		
	Roundworm		
	<i>Camallanus unispiculus</i> , <i>Eustrongylides tubifex</i>		
Conoidasida	Coccidia	3	13
	Isospora		
Microsporidea	Microsporidia	2	8
Cestoidea	<i>Senga taunsaensis</i>	2	8
	<i>Diphyllobothrium latum</i>		
Copepoda	<i>Harpacticoid copepod</i>	1	4
	<i>Dactylogyrus</i> spp.		
Monogenea	Monogene	3	13
	<i>Diplozoon indicum</i>		
Myxosporea	<i>Myxobolus</i>	1	4

Fish endoparasites have been of great concern. These parasites continually infect fish which may lead to reduction in growth and increase susceptibility to disease. Overall 26.3% of the collected samples of freshwater fishes were found infected by endoparasites, whereas, no parasite was found in *Mastacembatus armatus*. In intestine (40% of the examined fish) and gall bladder (28.5% of the examined fish) highest number of parasites was observed. Majority of fishes carry heavy burden of parasitic infestation, which causes deterioration in the food value of fish. *Rita rita* showed a high rate (60%) of infection. It was also observed that in *Rita rita*, *Labeo rohita* and *Catla catla* parasite infection increased with length of fish. There are reports indicating that parasitic infection

is directly proportional to the fish length such as in herring fish, *Parophrys velutus*, *Clupea harengus*, *Merluccius gayi* (Olson 1978, Carvajal et al. 1979). The positive allometric growth in *T. zillii* and *O. urolepis urolepis* species was observed by Nehemia et al. (2012). As the growth pattern is changed in size (weight and length) that deals with body proportion. Growth pattern is useful in monitoring the state of health of fish species (Oso et al. 2016, Kumary and Raj 2016). The results reported by Pandey et al. (2012) whereas are not in line with these findings. This discrepancy in the results may be due to the offered feed composition and attained immunity with the age of fish. In the present study, highest parasitic infestation was observed in large size fish whereas Pandey et al. (2012) reported highest parasitic infection in middle sized and lowers helminthes susceptibility in small and large size fishes. The reported overall prevalence of internal parasites of fish was 17.9% in Karachi Fish Harbour, 18.5% at Niger Delta Tidal Creek and 20.83% at Lake Ziway, respectively (Qasim and Ayub 2012, Ogbeibu et al. 2014, Bekele and Hussien 2015).

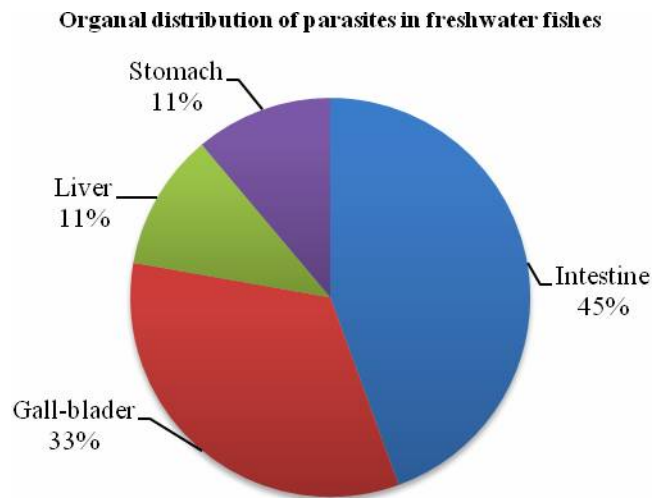


Fig. 1. Original distribution of parasites in freshwater fishes of Chenab River.

Difference in prevalence of parasites in fishes may be due to the feeding habits of the host fish, population density, their life span, moving through various habitats, change in the environmental conditions and body size (Berra 2001). Additionally, Khanum et al. (2008) reported that 50% of the *R. rita* were infected with parasite infestation and this infection was greater in females than in males. A study, similarly, was conducted by Ali et al. (2014) on prevalence of parasites in cultureable fish species of Pakistan. The later author recorded

maximum prevalence of parasites (35%) from fish samples that was collected from Muzaffargarh.

Many factors including physiological and biological features of a host determine the parasitic composition of a fish (Khanum *et al.* 2008). There is dearth of information, however, regarding distribution, pathogenic effects and control of most of the parasitic diseases in natural population of fresh water fish. Many specimens of larvae and adults of cestode were found in intestine of *C. carpio* with a prevalence of 2% (Mama and Abdullah 2014). The highest abundance of parasites (48%) in *Labeo rohita* was recorded in November, whereas this parasitic infestation was 44.2% in October and 46.4% in December. It has been reported that *Dactylogyrus* causes damage to the gill filaments of fishes and *Gyrodactylus* mainly causes damage to skin and fin which is a potential threat to fish culture (Hoffman 1999). The distribution of parasites in organs were found to be maximum in intestine (48.9%), whereas the stomach contains 31.9% and minimum (4.3%) parasites were in swim bladder (Qasim and Ayub 2012). Pollutants may increase parasitism by enhancing host susceptibility or by increasing the number of secondary hosts and vectors (Lafferty and Kuris 1999). The increase in parasitic population may be due to climatic variation, disturbances caused by farming or construction (Peek 2012).

CONCLUSIONS

Majority of fishes, including *Rita rita*, *Labeo rohita* and *Catla catla*, were carrying heavy parasitic infestation. Among organal distribution, highest prevalence of endoparasites was observed in intestine and gall bladder. The fauna of nematode and trematode were found greater in intestine of freshwater fishes of Chenab River. The present study showed that the diversity of endoparasites in freshwater fishes is high. Studies are, therefore, needed to summarize the impact of endoparasites in infected fish, with particular attention to freshwater fishes in human.

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