

OCCURRENCE OF POMPHORHYNCHUS SP. (ACANTHOCEPHALA) IN THE LIVER OF *SCHIZOTHORAX ESOSINUS* IN JHELMUM RIVER, KASHMIR.

Ahangar M. A*, Ahangar I. A.**, Mir M. F** and Chisti M. Z***

*Department of Zoology, S. P. College, Srinagar-190001, India.

**Hydrobiology Laboratory, S. P. College, Srinagar-190001, India.

*** University of Kashmir, Srinagar, India.

(Corresponding author- E-mail: ahangarzoo@gmail.com)

ABSTRACT

An investigation of parasites of *Schizothorax* (Native fish) collected from River Jhelum was undertaken. In general, there was mixed infection of cestod, Adenoscolex and Pomphorhynchus (Fig 2). However, there was maximum infection of Pomphorhynchus species (Acanthocephala) in the *Schizothorax* species of River Jhelum. Tremendous reduction in weight was observed in the infected fishes. The intestine of the infected fish with *Pomphorhynchus* species presented a nodulated appearance due to the protruded bulbs of the parasites. These parasites were seen to have penetrated through the intestinal wall with their ensheated ends floating freely in the coelom and the part of the trunk in the lumen of the intestine. The intestinal wall was completely disrupted at the point of penetration. During the investigation period, a single Acanthocephala was found penetrated in the liver of *Schizothorax* sp.

KEY WORDS: Acanthocephala, Pomphorhynchus, Jhelum River and *Schizothorax* spp.

INTRODUCTION

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 in river Jhelum over the last decade (Rukhsana *et al.*, 2008). The species being sensitive cannot withstand unclear waters. Since the water quality in the river has deteriorated over the years, the *Schizothorax* finds it difficult to thrive in water with depleted oxygen levels (Hussain *et al.*, 2003). 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). 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). All living beings can in certain circumstances become subjected to diseases and fishes make no exception. Fishes, like other animals, fall prey to large number of diseases by variety of parasites. The parasites are normally in a complex dynamic equilibrium with their hosts. Many parasites are responsible for high mortality rate, particularly in younger stages.

Destruction of host's tissues is one of the most common effects of parasitism. This may be by a mechanical action when parasites or their larvae migrate through or multiply in tissues or organs, or when various organs of attachment of parasites are inserted into fish tissues as anchors. Destruction may also be due to pressure as a result of increase in parasite size, multiplication or by blockage of ducts. Parasitization of the intestinal tract with even a few Acanthocephalids leads to acute inflammation and apparently is capable of influencing the growth rate of small fishes. Roubal (1993) studied the comparative histopathology of Longicollum (Acanthocephala) infecting the alimentary tract and spleen of a fish. He observed that the neck and proboscis had penetrated the entire gut wall. A layer of compact, rounded fibroblasts and scattered connective tissue fibres were surrounding the neck and proboscis.

The pathogenicity of parasitism has been reported to cause extensive damage to the host leading to the lower production of the fish (Rai, 1966). Present study was designed to make a comparative survey for the parasitic infections, including their identification and host specificity with regard to *Schizothorax* species in the River Jhelum of Kashmir Valley.

MATERIALS AND METHODS

Study Area

The study area for collection of fish hosts was river Jhelum. The fishes were collected at different reference points with the help of local experienced fishermen using Cost Net or Khuri. Every effort was made to bring the fish species alive to the Parasitology Research laboratory. After random collection at different sites of the study areas, the fish hosts were brought to the laboratory for identification and subsequent collection of helminth parasites.

Collection and Identification of Parasites

The live fishes were strummed by giving them heavy blow one by one on their heads. Physical parameters such as length, standard length and weight were also recorded. For parasitic observation, initially the entire outer surface 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). The prevalence, mean intensity and relative density of helminth parasites were calculated. Acanthocephalans which bore their proboscis into the intestinal wall were freed carefully by splitting the intestinal wall with the help of a pair of fine needles without causing any damage to the bulb or to the proboscis. Smaller specimens were pulled slowly from outside of the gut wall by holding beneath the bulb by a fine forceps. Acanthocephalans were collected in a dish containing normal saline. A drop of chloroform was also added to the medium to necrotize them. Specimens were also kept for some time in this solution till the proboscis was fully everted.

RESULTS

During the entire period of study there was maximum infection of *Pomphorhynchus* species (Acanthocephala) in the *Schizothorax* species of river Jhelum (figure-1). There was mixed infection of Cestode, *Adenoscolex* and Acanthocephala. Tremendous reduction in weight was observed in the infected fishes. In general fish appeared more elongated with a narrow body, sluggish and presented an emaciated look. The intestine of the infected fish with *Pomphorhynchus* species presented a nodulated appearance due to the protruded bulbs of the parasites. These parasites were seen to have penetrated through the intestinal wall with their ensheated ends floating freely in the coelom and the part of the trunk in the lumen of the intestine. In some cases only few acanthocephalans were found attached in the lumen but the outer wall of the intestine contained several ensheated *Pomphorhynchus* parasites entangled in the pink coloured cysts. During the investigation period, a single Acanthocephala was found embedded in the liver of *Schizothorax esosinus*. *Pomphorhynchus* species were deeply embedded with their proboscis and so much entangled in the intestinal tissue that they could only be separated with much difficulty.

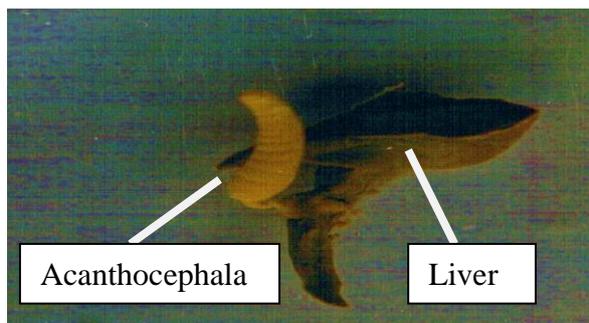


Figure 1. Liver of *Schizothorax sp.* infected with *Acanthocephala*



Figure 2. Mixed infection of *Adenoscolex oreini* and *Pomphorhynchus kashmirensis*

DISCUSSION

During the investigation period, the comparative helminth study showed the highest prevalence of parasites in *Schizothorax species*. The comparative differences in parasitism can be attributed to the different preferences for food, length and the resistance of the 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.

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). As reported earlier (Sures, 2004), the incidence of helminth parasites observed in the present study present a review in monitoring water pollution of the water body. 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 *Schizothorax*. It needs comprehensive physiological and immunological studies.

CONCLUSION

We conclude that there was a mixed infection of Adenoscolex species (Cestode) and Pomphorhynchus species (Acanthocephala) infecting the intestine of Schizothorax sp. However, a single acanthocephalan was found penetrated in the liver of the Schizothorax sp. which is the new finding in case of Schizothorax sp. The probable cause of infection to the liver is due to the deep penetration by juvenile Acanthocephalan from intestine to the Liver.

ACKNOWLEDGEMENT

The authors are highly thankful to the University Grants Commission for providing financial assistance for this work. We are also appreciating the help provided by the research associates in the laboratory during the need. We are also thankful to the non-teaching staff for assistance. Special thanks also go to Dr. Fayaz Ahmad for helping in the photography of samples.

REFERENCES

- Ali S. S. (1990).** An Introduction to Fresh Water Fishery Biology. University Grants Commission, Islamabad, Pakistan. pp 142-145. [URL: <http://www.dvmdocs.webs.com>]
- Amin O. M. (1986).** Caryophyllaeidae (cestode) from lake fishes in Wisconsin with a description of *Isoglaridacris multivittellari* from *Erimyzon sucetta*. *Proc. Helminthol. Soc. Wash.* **53**(1): 48-58.
- Bauer O. N. (1941).** Contributions to the knowledge of fish parasites of the river Khatanga. *Tr. In-ta. Pol. Zeml., ser. Prom. Khaz.* **16**: 84-103.
- Choudhry A., Hoffnagle T. I. and Cole R. A. (2004).** Parasites of native and non-native fishes of Little Colorado River Grand Canyon Arizona. *J.Parasitol.* **90**: 1042-1053.
- Dove A. D. (1998).** A silent tragedy; parasites and the exotic fishes of Australia. *Proceedings of Royal Society of Queensland* 109-113.
- Hine P. M. and Keneddy C. R. (1974).** The population biology of the Acanthocephalan, *Pomphorhynch laevis* (Muller) in the river Avon. *J. Fish Biol.* **6**: 665-679.
- Hussain A., Khan A. R. and Fayaz A. (2003).** Future trends in the decline of endemic fish of Kashmir. *Proc. Interdisciplinary Approaches Zool.Res.*, Kashmir University.
- Rukhsana A., Chishti M. Z. Fayaz A. Rehana, Bilal A. B. and Firdousa A. (2008).** Comparative Studies on Helminth Parasites of Declined Fish *Schizothorax esocinus* from two Water Bodies. *4th JK Science Congress* 194.
- Roubal Frank. R. (1993).** Comparative histopathology of Longicollum (Acanthocephalata; Pomphorhynchiridae) infection in the alimentary tract and spleen of *Acanthoporgnus anstrites*. *Int. J. Parasitol.* **23** (3): 391-397.
- Rai P. (1970).** On the pathogenic significance of the tapeworms Hithero reported from some of the freshwater fishes. *Agra Univ. J. Res.* **15** (2): 23-30.
- Shukla G. C. and Upadhyaya V. B. (1998).** *Economic Zoology*. Rastogi Publications, New Delhi.
- Sures B. (2004).** Environmental parasite relevancy of parasite in monitoring environmental pollution trends. *Parasitol.* **4**: 170-177.
- Weesner F. M. (1968).** General Zoological Microtechniques. The Williams and Wilkins Company Baltimore, USA. pp. 230.
- Yamaguti S. (1963).** *Systema Helminthum*. Interscience Publications, New York, London. 5(423).