Biological Forum – An International Journal **11(2): 113-116(2019)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Incidence of Helminth Parasites in freshwater Fishes of the River Indus at Jamshoro, Sindh, Pakistan

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(Received 22 July 2019, Accepted 25 September 2019)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Fish parasitism is one of the major public health problems in under developed and developing countries. Hence, it is significant to explore it. This initial report deals the preliminary result of ongoing research on helminth parasites of freshwater fishes of the River Indus in Sindh province, Pakistan. A total of 43 specimens of four species of freshwater fishes including *Wallago attu*, (n=9) *Mastacembelus armatus*, (n=9) *Mystus cavasius*, (n=11) and *Cirrhinus reba* (n=14) were examined. Live freshly captured hosts were collected from the River Indus at Jamshoro and were brought to the Laboratory of Department of Zoology, University of Sindh, Jamshoro. Fishes were dissected and contents were examined under stereo dissecting microscope for the presence of helminth parasites. Gut contents and visceral organs revealed highest prevalence for nematodes (60.46%), followed by trematodes (53.48%). The highest infection of nematode was found in *Wallago attu* (100%), followed by *Mystus cavasius* (90.09%), and *Mastacembelus armatus* (77.8%), whereas, *Cirrhinus reba* was found negative. The trematodes were found the highest in *Mystus cavasius* (90.09%), followed by *Mastacembelus armatus* (88.88%), and *Wallago attu* (55.5%) whereas, *Cirrhinus reba* fishes was found negative.

Keywords: Helminth parasites, freshwater fishes, Indus River, Sindh, Pakistan.

How to cite this article: Abro, M.M., Birmani, N.A. and Bhutto, M.B. (2019). Incidence of Helminth Parasites in freshwater Fishes of the River Indus at Jamshoro, Sindh, Pakistan. *Biological Forum - An International Journal*, **11**(2): 113-116

INTRODUCTION

Fishes form the half of vertebrate diversity and found in marine and fresh waters. They are good source of food, major mean of income and play key role in economy of a country. Ecologically, Fishes are at the apex of predator-prey pyramid in freshwater and marine ecosystem. Therefore, they are subjected to the considerable infection of helminth parasites. These adversely affect fish health decrease its nutritional value and badly disturb human health and well-being. Moreover, a large population in Pakistan face shortage of balance nutrition. There is dilemma of inadequate food supplements and escalated prices of quality edibles nutrients. The fishes are main source of good quality food. Besides, eleven hundred kilometers marine coastal line, Pakistan has large inland waters and rivers with adequate fish biodiversity. All these are a source of income for fishermen.

For obtaining better nutrition from the fish, they must be parasite and disease free. In order to take preventive measure, it is imperative to study the prevalence of helminths and nature of diseases. Furthermore, the parasitic infection tends to reduce the growth of the fish (Khan and Yaseen, 1969). The helminth parasites cause major diseases than other parasites in fishes and easily transmitted to human beings who serve as the definitive host for a variety of parasites.

The Parasitic diseases pose a very real and constant threat to hatcheries and fish cultivation.

In Pakistan the helminth parasites of marine fishes have been examined substantially including Khan (1969); Wahid and Parveen (1969); Bilqees *et al*., (1972); Zaidi and Khan (1975, 1976); Bilqees *et al*., (1977); Bilqees (1980); Akram (1988, 1997); Ahmed *et al*., (2007) and Khan *et al*., (2011).

There are a few reports about helminth parasites of freshwater fishes of Pakistan. Researchers including Rizvi (1974); Rehana and Bilqees (1980); Siddiqi and Khattak (1984); Khan, (1985, 1991); Bilqees (1986, 1991); Khan and Bilqees (1990); Nazir (1996); Habib (1996); Ghazi and Ataur-Rahim (1999); Rafique *et al.*, (2002); Naqvi *et al.*, (2009); Nawaz *et al*., (2007, 2006, 2009, 2009); Kakars, (2002); Kakarand Kakar Suleman Khel (2004, 2005); Kakar, and Bilqees, (2007, 2008); Kakar *et al*., (2008a, 2008b, 2009, 2013); Shaikh and Bilqees (2008, 2011) and Bilqees (2014) studied helminths of freshwater fishes randomly. Only a few authors studied helminths of freshwaters of Sindh.

A considerable work has been done on the helminth parasites of freshwater fishes throughout the world but in Pakistan this subject has been neglected in past especially in Sindh province. Therefore, it was proposed to carry out an extensive research work on the helminth parasites of freshwater fishes of Sindh province, Pakistan.

The present report deals the incidence of helminth parasites of four species of fresh water fishes collected from the Indus River at Jamshoro, Sindh, Pakistan. This report is just window to broad spectrum of helminth community inhabit fishes of the Indus river.

MATERIAL AND METHODS

During current study a total of 43 fishes were collected from the Indus river at Jamshoro for the presence of helminth parasites. Live captured fishes were brought to the laboratory of Department of Zoology, University of Sindh, Jamshoro, Pakistan for further studies. They were dissected longitudinally using scissors from the anus to the bottom of the jaw, carefully not to cut fish internal organs. In addition to alimentary canal, organs like; heart, liver, swim bladder, kidneys, spleen, body cavity, genital organs, gills and eyes were also examined for the helminth parasites. These organs were removed and transferred to the Petri dishes containing saline solution. Thorough examination of each organ was done under AmScope 7X-45X Dual Lit 6W LED Trinocular Stereo Zoom Microscope. The collected helminths include nematodes and trematodes. In case of nematodes, live specimens were killed in hot 70% ethanol and preserved in alcohol–glycerol solution in vials. Temporary mounts in glycerol and lacto–phenol were made for the detailed study. The trematodes were quite muscular and were flattened by pressing them in between plain slides and cover slips and tied with cotton thread by applying adequate pressure that may not cause any damage to specimen. The flattened trematodes were transferred to fixing agent alcohol–formalin–acetic acid (AFA) for overnight. After fixation, the specimens were thoroughly washed with 70% alcohol. The flattened specimens were stained with borax–carmine, rinsed in 70% alcohol and followed by dehydration through 80%, 90% and 100% alcohol. After complete dehydration, specimens were cleared in clove oil and xylene and finally mounted permanently in Canada balsam. The slides were placed in oven at 55-60°C overnight.

RESULTS AND DISCUSSION

Present study is based upon the helminthological survey of freshwater fishes of river Indus collected at Jamshoro. Initially, forty-three specimens of four edible fish species were examined during April and May of 2018. These include, *Wallago attu* (n=9), *Mastacembelus armatus* (n=9), *Mystus cavasius* (n=11), and *Cirrhinus reba* (n=14). A total of 60.46% of examined fishes were infected with the helminth parasites. Amongst them, the highest prevalence (60.46%) was recorded for the nematodes and 26 hosts were infected. The 23 fishes were infected with trematodes (53.48%) (Table 1). No monogeans, cestodes and acanthocephalans recoded so far in this study.

As far as specific host infection is concerned all nine examined *Wallago attu* were infected with 55 nematodes and revealed 100% prevalence. Whereas, only five *W. attu* were infected with 13 specimens of trematodes. All *Wallago attu* were negative for cestodes, monogeans and acanthocephalans. The nine specimens of *Mastacembelus armatus* were examined seven were infected with 17 nematodes and eight were infected with 16 trematodes and nocestodes, monogeans and acanthocephalans recovered from them. In *Mystus cavasius* out of eleven examined specimens 10 were infected with 19 nematodes and same number of host were infected 54 trematodes and nocestodes, monogeans and acanthocephalans recorded. Moreover, all examined *Cirrhinus reba* were found negative for nematodes, trematodes, cestodes, monogens and acanthocephalans (Table 2 and 3).

The maximum parasitic load was recorded in *Wallago attu* in which all fishes harbored helminth parasites, therefore, showing 100% prevalence, followed by *Mystus cavasius* (90.09%) and *Mastacembelus armatus* (88.88%). None of the parasitic group was recorded in *Cirrhinus reba***.**

Above hosts were also studied previously by a few researchers**.** Rehana and Bilqees (1972) examined seven *Wallago attu* and found two host infected with seven nematodes. Siddiqi and Khattak (1984) examined five *Wallago attu* and found all positive with trematodes. Soofi, *et al*., (2017) studied 67 *Mystus cavasius* and found five host infected with seven trematodes. Moreover, Rafique *et al*., (2002) dissected 48 *Mystus vittatus* and found 18 (37.7%) infected with nematodes. Ahmed *et al*., (2007) examined 16 *Mystus vittatus* and recorded 6 hosts (37.5%) infected. Devi *et al.,* (2015) reported 56% *Mastacembelus armatus* harbouring nematodes and they recorded no cestodes, trematodes and acanthocephan in them.

These studies showed presence of trematodes and nematodes in studied fishes. However, infection rates varies from present study it may be due to difference of locality and time of study and maturity of studied host.

Moreover, in present study only two groups of helminths including trematodes and nematodes were recorded. The maximum parasitic burden was recorded in *Wallago attu* and *Mystus cavasius. Wallago attu*, has 100% prevalence of nematodes and 55.5% of trematodes. *W. attu* is a predatory fish, mainly piscivorous and also eats variety of invertebrate, zooplanktoon and phytoplanton and remains at risk to be infected with parasites. *Mystus cavasius* has 90.09% prevalence of nematodes and trematodes. It feeds ominously on zooplanktons, crustaceans, round worms, insects, parts of insects, insects larvae and molluscs and has fair chances to acquire the infection from food and surroundings. *Mastacembelus armatus* was recorded with (88.88%) of trematodes and 77.8% of nematodes. It shares and lives in same surrounding as above discussed fishes and may readily acquire parasitic infection.

Although, *Cirrhinus reba* was found negative for any helminth group, which clearly indicates its herbivorous feeding habit. That is why *Cirrhinus reba* found negative for the parasitic infection.

CONCLUSION

The initial survey of helminths of four edible fishes revealed the presence of trematodes and nematodes in carnivorous and omnivorous fishes and no helminth parasite found in herbivorous fish. However, no monogeans, cestodes and acanthocephalans recorded in this phase of study.

Table 1: Showing the prevalence of helminth parasites in fishes.

Helminth	No. of fishes infected	Prevalence %
Trematodes	23	53.48
Nematodes	26	60.46
Cestodes	00	00
Acanthocephalans	00	00

Table 2: Showing the prevalence of nematodesin fish.

S. No.	Name of Fish	No. of fishes examined	No. of fishes found positive	No. of nematodes collected	Prevalence
1.	*Wallago attu*	9	9	55	100
2.	*Mastacembelus armatus*	9	7	17	77.8
3.	*Mystus cavasius*	11	10	19	90.09
4.	*Cirrhinus reba*	14	—	—	—

Table 3: Showing the prevalence of trematodes in fish.

S. No.	Name of Fish	No. of fishes examined	No. of fishes found positive	No. of trematodes collected	Prevalence%
1.	*Wallago attu*	9	5	13	55.5
2.	*Mastacembelus armatus*	9	8	16	88.88
3.	*Mystus cavasius*	11	10	54	90.09
4.	*Cirrhinus reba*	14	—	—	—

ACKNOWLEDGEMENT

This research study is the part of the research project No. 20-3426 under National Research Program for Universities (NRPU) funded by HEC, Islamabad. It is also part of Ph. D. research of first author.

Conflict of Interest. There is no conflict of interest.

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