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Original Article

Incidence of *Lernaea* (Crustacea: Copepoda) parasitic in the Mashkid River Basin, Southeast of Iran

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Abstract: In the present investigation, *Lernaea* parasite was reported in the examined fish species, collected from the Mashkid River basin, Southeast of Iran in 2012 and 2013. *Lernaea* parasites were isolated from the external surface of eye, fins, operculum and body of *Bangana dero*, *Cyprinion microphthalmus*, *Gonorhynchus diplocheilus* (Cyprinidae), *Aphanius dispar* (Cyprinodontidae), *Channa gachua* (Channidae) in different water bodies. The highest infection was found in native fish, *B. dero* with nine parasites in single specimen. The exotic fishes were not infected.

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Introduction

Iran is located a region of major zoogeographical interchange having remarkable biodiversity attracting naturalists and scientists (Esmaeili et al., 2010). Based on field work, maps, fish distribution, previous studies (Sadati,1977; Armantrout, 1980; Coad, 2013), and hydrography, 19 major basins have been recognized in Iran (Coad, 2013). The Hamun-e Mashkid (= Mashkel) which lies within Pakistan on the border with Iran is one of these basins. The Mashkid River starts from the east of the mountains draining into the Hamun-e-Jazmurian basin and flows east into Pakistan. Two tributaries of the Mashkid within Iran are the Rutak River and the Simish (= Sunish River) which drain the lowlands between Kuh-e-Birag and the Badamo Range from the northwest to enter the Mashkid River southeast of Saravan (Coad, 2013). This basin has been poorly investigated in terms of fish fauna and parasites.

However, with increased attention on parasitism and disease as threats to biodiversity, there is a need to identify the pathogens and parasites, which pose significant risks (Daszak et al., 2000; Smith et al., 2006) especially the globally distributed parasite *Lernaea*. *Lernaea* species, which commonly referred to anchor worms, are common pests in freshwater fishes particularly of cyprinids and amphibians (Piasecki et al., 2004; Kupferberg et al., 2009). Pathogenicity of lernaeids depends largely on the size of their host and attachment site preferences. (Fryer, 1968; Paperna, 1996). *Lernaea* spp. can cause severe fin damage (Shariff and Roberts, 1989). As a rule, *Lernaea* has been the cause of great economic losses of fish in many parts of the world (Shariff and Roberts, 1989). Parasite in fishes have been a great concern since they often create disease conditions in fish which will lead to an increase in fishes susceptibility to other disease causing nutritive evaluation of fish as well as fish loss (Raissy et al., 2013). The present study reports the parasitic crustacean *Lernaea* from freshwater fishes of Mashkid River basin, Iran.

Materials and methods

Fish specimens were collected during fieldwork in 2002 and 2013 in Mashkid River basin (in Dahak,

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Table 1. Fish species collected from Mashkid River basin

Order	Family	Species	Native/Ex
Cypriniformes	Cyprinidae	*Aspidoparia morar*	Native
		Bangana dero	Native
		Carassius auratus	Exotic
		Ctenophryngodon idella	Exotic
		Cyprinion microphthalmum	Native
		Cyprinus carpio	Exotic
		Garra rossica	Native
		Gonorhynchus diplocheilus	Native
		Pseudorasbora parva	Exotic
	Nemacheilidae	*Paraschistura bampurensis*	Native
Cyprinodontiformes	Poecilidae	*Aphanius dispar*	Native
	Cyprinodontodae	*Gambusia holbrooki*	Exotic
Perciformes	Channidae	*Channa gachua*	Native

Table 2. Infected fishes with *Lernaea* parasite found in Mashkid River basin of Iran

Species	Standard Length	Weight (g)	No. of collected	No. of infected	Occurrence of parasite			
					Eyes	Fins	Muscles	Operculum
A. dispar	23-28	0.4-0.6	63	3		*	*	
A. morar	47-60	1.6-2.6	149	6		*	*	
B. dero	58-204	3.88-141.33	6	4	*	*	*	*
C. gachua	131	42.67	52	1		*		
C. microphthalmum	81-109	13.3-35.44	174	7		*		
G. diplocheilus	32-94	0.62-18.3	95	13		*	*	

Figure 1. *Aphanius dispar* infected by *Lernea*.

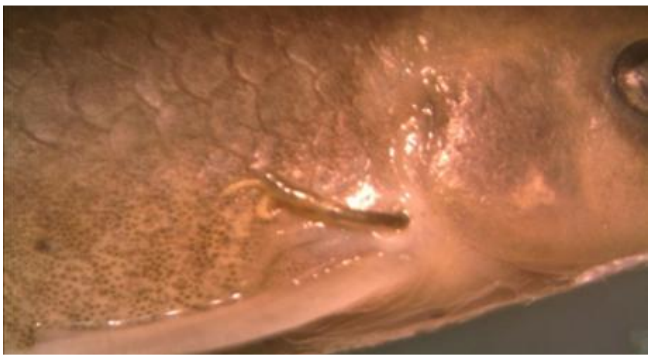

Figure 2. *Gonorhynchus diplocheilus* infected by *Lernea* parasite.

Gavarnagan, Roodtak and Mashkid, Saravan city), using electrofishing device and hand net. Identification of fish specimen carried out based on Coad (2013). External surface of all individuals were investigated macro- and microscopically for detecting lernaeid parasites. The worm-like objects of lernaeid parasites were examined under light microscope for diagnosis of the infection. *Lernaea* parasites were carefully detached from the infected parts of skin, fins, eyes, and musculature tissues.

All the collected fish specimens were stored in the Zoological Museum-Collection of Biology Department, Shiraz University (ZM-CBSU).

Results

Based on fieldwork conducted on the ichthyofauna of the Mashkid river basin in 2012 and 2013, 698 fish specimens were collected belonging to 13 species,

13 genera and five families (Table 1). Lernaeid parasite were separated from six species including *Aspidoparia morar*, *Bangana dero*, *Cyprinion microphthalmum*, *Gonorhynchus diplocheilus* (Cyprinidae), *Aphanius dispar* (Cyprinodontidae) and *Channa gachua* (Channidae) in different water resource. Parasites were detected in different body parts in variant species (Table 2, Figs. 1 and 2). The highest infection was found in *B. dero* with nine parasites in a single specimen. The other collected species in different localities were *Carassius auratus*, *Ctenopharyngodoni idella*, *Cyprinus carpio*, *Garra rossica*, *Pseudorasbora parva* (Cyprinidae), *Paraschistura bampurensis* (Nemacheilidae) and *Gambusia holbrooki* (Poecilidae).

Discussion

Lernaea is a copepod, which is parasitic on many species of freshwater fishes and is extremely common among the cyprinid fishes. The data reported here are concerned with the occurrence of *Lernaea* parasites in six native species belonging to three orders collected from the Mashkid River basin in Iran. Usually, *Lernaea* is a common parasite of the cyprinid fishes. However, it has infected other distantly related group, *A. dispar* (Cyprinodontiformes) and *C. gachua* (Perciformes) in Mashkid River basin. There are several reports, both historical and recent, of *L. cyprinacea* using amphibians as hosts in many countries (see Kupferberg, 2009).

Although the parasite occurs on other fish species, *Bangana dero* was the most heavily infected and the parasites were found in eyes, fins, body muscles and operculum of this native cyprinid causing Lernaeasis. The lernaeasis is one of the most dangerous diseases appearing among different native and exotic fish species causing disastrous influence on the economically important fish species (Jazebizadeh, 1983).

Here we present the first record of Lernaeid parasite in southeast of Iran and in the Mashkid River (see Pazooki and Masoumian, 2012). At the present study, 34 out of 698 studied fish (≅5%) with different infection rate are infected with lerneaid parasite. Interestingly all of the infected fishes are native species revealing sensitivity of the native fishes to this parasite. The difference in infection rate in studied fish species may be due to differences in biology, nutrition, behavior of fish and environmental conditions.

Lernaea sp., the most common copepod parasite in the freshwater aquaculture in Iran, being highly pathogenic to fishes (Barzegar et al., 2008). *Lernaea* spp. can cause severe fin damage (Shariff and Roberts, 1989). However, pathogenicity of lernaeids largely depends on the size of their host and attachment site preferences (El-Mansy, 2009). As a rule, large numbers of *Lernaea* can cause serious problems resulted from severe wounds. The infected fishes are not eliminated directly by the parasite, however, it may open routes for secondary infection and finally, related growth retardation, behavioral changes and associated secondary invaders may lead to death of the infected individuals (Robinson and Avenat-Oldewage, 1996).

There are different views on the effect of length and weight of the fish on parasitic infection rate. Some believe that smaller fishes had more parasitic infection rate (Bazari Moghadam, 2009), but other thought infection rate increases with increasing weight and length. We did not found any statistical relation between infection rate and biometric characteristics of the examined fish as we found parasites in both small (*A. dispar*) and large (*B. dero*) species.

Due to impacts of *Lernaea* parasites on native fishes of the Mashkid River basin, a long term monitoring of the parasites and fishes is highly recommended.

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