

Parasitic Fauna of Six Species of Ornamental Freshwater Fish Species from the North of Iran

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Abstract: The main objective of this study was to determine the parasitic infections of aquarium fish in the North of Iran. Here, 360 apparently healthy ornamental fish from 6 species (each species 60 specimens) including: Guppy (*Poecilia reticulata*), gourami (*Osphronemus gouramy*), Swordtail (*Xiphophorus hellerii*), Platy (*Xiphophorus maculatus*), *Brachydanio rerio* and barbs (*Barbus tetrazona*) was obtained from a local ornamental fish farm in the North of Iran during 2012-2013. Each fish was inspected and examined by routine methods. The parasitological infection was studied by sampling from different organs. Among 360 investigated ornamental fish, 328 fish (91.1%) were infected by at least one parasite species. In this study, 5 different genus including: *Ichthyophthirius multifiliis*, *Dactylogyrus*, *Gyrodactylus*, *Tricodina* and *Capillaria* sp. were collected from 6 species. Also, *Capillaria* sp. was reported as a first record from the abdominal cavity of *O. gouramy* in Iran.

Key words: Parasitic fauna, Ornamental fish, *Capillaria* sp., infected, Iran

INTRODUCTION

The trade in ornamental aquarium species comprises two sectors, marine and freshwater. It is a multi-million dollar industry involving the harvest, sale and use of live animals for display in aquaria and garden ponds and lakes. Aquarium keeping is a hobby that has become more and more popular in industrialized countries and has been rated as the 2nd most popular hobby and most popular type of pet. They are a significant source of overseas benefit for many rustic communities in Africa, South America and South East Asia. Thousands types of aquarium fish (commonly, poeciliids, guppy and cichlids) are collected and maintained by hobbyists (Meshgi *et al.*, 2006). The biggest portion of the aquarium fish industry is the freshwater aquarium fish sector. Cultivation and propagation of ornamental fishes have been increased in the last 20 years in Iran. There are 150 species of aquarium fish in Iran and about 40 species are bred and raised in the country (Meshgi *et al.*, 2006).

Although, this worldwide interest in ornamental fish has led to development in their cultivation techniques,

there are still many difficult-to-culture species with high demand. Ornamental fish pathogens spread very rapidly in the world because of their commercial benefits. Consequently, routine infectious disease controls are very important for risk analysis and precaution steps. Fish parasites and their effects have become increasingly visible during the latest decades because of the development in the freshwater ornamental fish industry throughout the world (Jalali, 1997). Parasitic diseases in fish seriously limit aquaculture production and its economic viability (Moravec, 1994). Therefore, knowledge about fish parasites is an essential prerequisite for successful aquaculture. For this reason, this study was carried out to determine the health status of six aquarium fish species in the North of Iran during 2012-2013.

MATERIALS AND METHODS

A total of 360 apparently healthy ornamental fish from 6 species (each species 60 specimens) including: guppy (*P. reticulata*), gourami (*O. gouramy*),

Swordtail (*X. hellerii*), Platy (*X. maculatus*), *B. rerio* and barbs (*B. tetrazona*) were obtained from a local ornamental fish farm in the North of Iran. Live fish were transferred to central laboratory with aerated water with a portable air pump. The physicochemical parameters of the water were measured, during the fish collection. The water temperature was $22\pm 2^{\circ}\text{C}$, Dissolved Oxygen (DO) was $4.9\pm 0.8\text{ mg L}^{-1}$ and pH was 6.8 ± 0.8 .

The external surface, abdominal cavities and digestive tracts were examined for any possible presence of parasitic fauna. Collecting, fixing, staining and mounting of parasite specimens were done according to standard protocols (Meshgi *et al.*, 2006). The photograph was taken with the aid of a microscope that was equipped with micrometers and a Sony camera. Identification of the parasites was carried out using morphometric and morphology criteria (Jalali, 1997; Bauer, 1987; Moravec *et al.*, 1988).

RESULTS AND DISCUSSION

Among the 360 fish examined, 328 fish (91.1%) were infected by at least one parasite species. One nematode (*Capillaria* sp.), two protozoa (*Tricodina* sp. and *I. multifiliis*) and two Monogeneans (*Dactylogyrus* and *Gyrodactylus* sp.) was identified in six different fish species (Table 1). All identified parasites were in external surface, except for *Capillaria* sp., that isolated in the abdominal cavity of *O. gouramy*. During this study, clinical signs including, hemorrhagic areas on the skin and gills, fins bleeding, scales losing, fin rot was observed in some fish.

Ornamental fish farming is an important primary industry. Aquarium fish constitute an extremely large

segment of the pet animal industry (Winfree, 1989; Noga, 2010). The breeding and rearing of ornamental fish has a peculiar spot in the world and plays an important role in exchange income and occupation of some states. The world business of this fish which was estimated roughly \$900 million has devoted a remarkable insight into it (Meshgi *et al.*, 2006).

Diseases problem including hazards caused by parasitic organisms are the primary threat to further growth of this industry. Diseases caused by parasites are widespread and could diminish the fish in intensively stocked ponds and aquaria. Parasites imported by ornamental fish may present risks, both to native fish populations and to the aquaculture industry (Jalali, 1997). Fish parasites and their effects have become increasingly visible during the latest decades because of the growth of freshwater ornamental fish industries throughout the world.

The debut of a new parasite may cause devastating effects on native fish species, as these may not have evolved appropriate defense mechanisms against foreign organisms.

Different parasite species were reported from various ornamental fish species around the world. *Tetrahymena* sp., from *Carnegiella strigata*, *Piscinoodinium pilulare* from *Carnegiella martae*, *Trichodinids* sp., from *C. strigata*, *C. martae* and *Nannostomus*, *Procamallanus* sp., from *Paracheirodon axelrodi* (Tavares-Dias *et al.*, 2010). *Gyrodactylus katharine* and *Gyrodactylus carassii* from *C. carassius* (Koyun, 2000), *Ichthyobodo* sp., *I. multifiliis*, *Chilodonella* sp., *Tricodina* sp., *Dactylogyrus extensus*, *Gyrodactylus bullatarudis*, *L. cyprinacea*, *Argulus foliaceus*, *Argulus japonicus* and *Capillaria* sp., from gold fish, guppy and cichlids (Koyuncu, 2009), *Ambiphyra* sp. from guppy (Kayis *et al.*, 2009) and *Oodinium pillularis* from *Poeciliidae*.

There is some information about the parasite fauna of ornamental fish in Iran: *Dactylogyrus rotator*, *Chilodonella* sp., *Hexamita* sp., *Ichthyobodo necator*, *I. multifiliis*, *Microsporidium*, *Myxosporidia* sp., *Tricodina* sp. and *L. cyprinicea* were reported in aquarium fishes around Tehran (Meshgi *et al.*, 2006). *I. multifiliis*, *Gyrodactylus* sp., *Dactylogyrus* sp., *Tricodina* sp., *Argulus coregoni*, *A. japonicas*, *A. foliaceus* from *C. auratus* (Mousai *et al.*, 2011), *I. multifiliis*, *Dactylogyrus* sp. and *Lernaea* sp., from *P. reticulata* in Ahvaz Province (Khalafian *et al.*, 2010), *I. multifiliis*, *Dactylogyrus*, *Microsporidian* and *Ichthyobodo* sp. from angelfish were reported in the Mazandaran Province by Taherpour *et al.* (2012).

The results of the present study showed that 328 ornamental fish (91%) were infected by at least one parasite species. *I. multifiliis*, *Capillaria*, *Tricodina*,

Table 1: Parasitic fauna in ornamental fish according to this study

Host	Parasites	Infected organ	Percent of infected fish	Range of contamination
<i>Brachydanio rerio</i>	<i>Dactylogyrus</i> sp.	Gills	6.6	1-4
	<i>Gyrodactylus</i> sp.	Skin	3.3	1-4
<i>Ospchronemus gouramy</i>	<i>Dactylogyrus</i> sp.	Gills	5.0	1-3
	<i>Gyrodactylus</i> sp.	Skin	1.6	1-5
	<i>I. multifiliis</i>	Skin/fin	10.0	1-9
	<i>Tricodina</i> sp.	Skin	6.6	1-7
	<i>Capillaria</i> sp.	Abdominal cavity	8.3	1-2
<i>Xiphophorus hellerii</i>	<i>Dactylogyrus</i> sp.	Gills	16.6	1-2
	<i>Gyrodactylus</i> sp.	Skin	3.3	1-2
	<i>I.I. multifiliis</i>	Skin/fin	8.3	1-5
	<i>Tricodina</i> sp.	Skin/fin	6.6	1-3
<i>Xiphophorus maculatus</i>	<i>I. multifiliis</i>	Skin	11.6	1-7
	<i>Tricodina</i> sp.	Skin/fin	5.0	1-6
<i>Poecilia reticulata</i>	<i>Dactylogyrus</i> sp.	Gills	15.0	1-3
	<i>Gyrodactylus</i> sp.	Skin	11.6	1-4
	<i>I. multifiliis</i>	Skin/fin	10.0	1-9
<i>Barbus tetrazona</i>	<i>I. multifiliis</i>	Skin/fin	3.3	1-6
	<i>Tricodina</i> sp.	Skin	6.6	1-8

Dactylogyrus and *Gyrodactylus* sp. were identified in 6 different fish species. All identified parasites were in external surface except for *Capillaria* sp. that isolated in intestine of *O. gouramy*, *Dactylogyrus* sp. were observed as highest prevalence (16.6%) in all parasites in *X. hellerii*. The highest prevalence of Gyrodactylidae and Dactylogyridae in their skin and gills, occurred in *B. rerio* and *X. hellerii*, respectively and the lowest in *X. maculatus* and *B. tetrazona* that no parasite was observed.

All identified parasites were reported in previous studies but *Capillaria* sp. was reported as a first record of *O. gouramy* in Iran. This nematode may cause a high mortality in aquarium fishes. Rahmati-Holasoo showed that infection with *Capillaria* sp. could cause a great loss in ornamental fish from Cichlidae in Iran.

In the last decade, different ornamental fish farms in Iran have bred, rearing and importing of aquarium fish and their number is increasing. One of the most important ways in the transmission of parasitic infestations is importation of fish from one country to the others which are infested by these parasites. A large number of different species of ornamental fish including different kinds of angelfish, poeciliids, guppy and cichlids are imported annually from Southeast Asian countries to Iran. Uncontrolled importation of live fish can lead to transmission of different parasites to the native fish and cause economic loss. Likewise, their transmission can due to serious environmental losses to valuable native fish. Because of the societal and economic importance of the ornamental fishing industry, it is necessary to improve capture practices, from the stage of handling and maintenance of fish in the field, to their dispatch by exporters.

CONCLUSION

Monitoring of the health status of ornamental fish needs to be one of the most important activities in exportation holding facilities because any ornamental fish trade operation without adequate sanitized practices will lead to significant economic losses for the exporter, as well as having a negative influence on exportation. There are few studies on parasite fauna that infect aquarium fish in Iran. In order to improve aquarium fish trade in Iran and also the prevention of the losses of fish stock, more information on the parasite fauna that affects aquarium fish and also their transfers to farms is needed.

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