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Evaluating and Identifying the Parasitic Infestation of *Cyprinus carpio* at Godar River (Naghadeh City of Iran)

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The west Azerbaijan province is one of the most liable provinces for the investment of the aquaculture industry in the country. Warm-water fish susceptibility to various pathogens, especially parasitic infestation, can cause serious damages to aquaculture and finally the production efficiency is decreased. The study focuses on the identification of parasitic infestations in *Cyprinus carpio* in Naghadeh, which is one of the most important centers of fish farming in West Azerbaijan province. Considering the sampling technique, the fish samples were carefully transferred to the Parasitological laboratory of Islamic Azad University of Naghadeh and after registering the biometric and physical symptoms features, the parasitological experiment was instigated by taking samples from the surface and internal organs of fish and were evaluated. In this research a total of 300 fish samples were analyzed among which fish samples were infected with *Ichthyophthirus multifflarfs* with infestation frequency of 40%, 63 fish samples were infected with *Dactylogyrus monogeneses* parasite with the infestation frequency of 21% percent, 31 fish samples were infected with ocular parasites of *Diplostomum spahtaceum* with infestation frequency of 10.33%, 35 fish samples were infected with Lernea cyprinae parasites with the frequency of 11.66%, 11 fish samples were infected with *Ligulla intestinalis* parasites with a frequency of 3.66% and 6 samples were infected with *Caryophyllaceous laticeps* parasites with the frequency of 2%. The results showed that the highest isolated parasites prevalence happened in the warm months of the year. The obtained results and data were analyzed using two-way ANOVA, Excel, and SPSS computer programs.

Key words: Parasites, *Cyprinus carpio*, Godar River, Naghadeh, Iran.

With the development of aquaculture, the fish parasitological studies have become more important. One of the main conditions for the production of aquatic animal is maintaining the health and preventing illness among these animals among which the parasites play an important role. The Identification, classification, and distribution analysis of aquatic parasites in aquatic environment is important in various aspects. On the one hand, the identification of fish particular parasites will evaluate the fish potentiality to different parasites, which is very important in prevention planning of fish diseases. On the other

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hand, the parasites life cycle analysis of and the role of intermediary hosts in the aquatic environment and biological fight against them is one of the most important and interesting fact in the ecology. Regarding the fish farming industry development in the West Azerbaijan province and possible transfer of parasitic infestation of native (local) fish to farmed fishes, the parasitological studies seem necessary.

Generally, the parasite has a direct relationship with the following: host environment extent, host age, seasonal changes, climatic changes, fish dietary, physiology and morphology, geographical factors, host fish migration, fish population increase and synchronization of the parasite and Host life cycle. Parasites may reduce mortality and growth rate and cause delayed sexual maturation and sterility, which prepares the grounds for fish bacterial, viral, and fungal diseases (Jalali, 1998; Abbasi, 1994). The most common species of *Digenea* parasite is the ocular parasite of *Diplostomum spahtaceum* on which many studies have been conducted to see the infestation rate and impact of such parasite on the fishes. With respect to this all-inclusive parasite studies, the *Diplostomum spathaceum* has still infecting the warm, cold water fishes, and even *Acipenseridae* (Nassiri, 2006; Rahmani *et al.,* 2012a; Rahmani *et al.,* 2012b; Rajan and Revathi, 2011; Ranjan, 2011; Ozoko, 2012).

One of the most common fish diseases is Monogenesis infestation, which is caused by various species of *Dactylogyrus* and *Gyrodactylus* and is held responsible for many injuries and mortalities in fish. Due to the fact that Monogenea do not require any host organism to reproduce, they are multiplied quickly and in large numbers which feed on the blood and Epithelial cells and gills that not only kill fishes larva but also instigate a great decrease in the growth rate of the farmed fishes and reproductive fish and also increasing the sensitivity to lots of bacterial and fungal diseases are included.

Evaluating the freshwater fish *Monogenea* of Iran was established for the first time in 1949 by Bychowsky on identifying four *Monogenean* species on fishes in Karkheh (Bychowsky, 1949). Afterwards, over a hundred species of *Dactylogyrus, Gyrodactylus, Anchyrocephalus, Ensyrudaykuides, Paradiplozoon (*Bychowsky, 1949; Gussev *et al.,* 1993; Jalali and Molnar, 1990). Among different fish parasites, most injuries and mortalities are caused by crustaceans and leeches in a way that sometimes a crustacean or a leech cause the death of a fish larva and their swarming in the water will cause a wholesale mass murder of the fishes which reduces the economic value and will reduce their marketability (Abdi *et al.,* 1995; Rahmani *et al.,* 2012a; Rahmani *et al.,* 2012b; Rajan and Revathi, 2011; Ranjan, 2011; Ozoko, 2012).

The present study is an attempt to evaluate the fish infestation of the Godar River in Naghadeh, which focused on a wide variety of parasites including *Platyhelminthes, Nemathelminthes, Protozoa*, and *Crustaceans* for the first time. The study is a step to identify the fish parasites to provide the ground for the further researches on the interrelation between the fishes and parasites and the parasitic infestation effect on the fish resources of the lake.

MATERIALS AND METHODS

The sampling was conducted in summer, autumn and winter 2010 and spring 2011. Two times in each season and 50 samples for each time provided more than 300 samples for the study. The fishes were caught by big fishing net, fish traps, and wing nets and were put into the lidded plastic containers and sent live to the equipped laboratory of Islamic Azad University of Naghadeh. After anesthetizing the fishes, the analysis for the parasitological examination on skin, fins and gills by macroscopic lesion on fishes were conducted using different head stroke and by a magnifying glass at magnification size of 4x-2. Then, the parasitological studies were performed using samples of the skin, fins, and gills and were analyzed by microscope at magnification level of 40 to 100 for identifying the parasites (Janddykova, 1992).

The parasitological studies in the abdominal area was also conducted for which the intestinal contents of fishes were separately emptied into a 100 micron sieve and after washing in a plate were examined by stereomicroscope. The parasites were taken by Pasteur pipette and put on a slide based on the guidelines put forward by Fernando *et al.,* (Fernando *et al.,* 1972) and Gussev

(Gussev, 1983) and were fixed by ammonium Pikarate. The species were distinguished through identifying keys of Gussev (Gussev, 1985) and Jallali (Jalali, 1998) and Apostohopter clips and reproductive organs. In addition, in order to identify the protozoa, the Fernando et al (Fernando *et al.,* 1972) guidelines were fixed for the samples and to identify the Protozoa. Because most crustaceans attach themselves to the external members of the fish, their separation was performed using a forceps. The isolated crustacean parasites were stored in formalin 4% for accurate identification.

RESULTS AND DISCUSSION

The conducted parasitological studies showed that from a total of 300 fish samples of *Cyprinus Carpio* in Naghadeh that were analyzed, 120 fish samples were infected with *Ichthyophthirus multifflarfs* with infestation frequency of 40%, 63 fish samples were infected with *Dactylogyrus monogeneses* parasite with the infestation frequency of 21%, 31 fish samples were infected with ocular parasites of *Diplostomum spahtaceum* with infestation frequency of 10.33%, 35 fish samples were infected with *Lernea cyprinae* parasites with the frequency of 11.66%, 11 fish samples were infected with *Ligulla intestinalis* parasites with a frequency of %3.66 and 6 samples were infected with *Caryophyllaceous laticeps* parasites with the frequency of 2%. The results also reveal the fact that there was a significant relationship between the infestation rate of the separated parasites and the warm summer days and the highest amount of fish infestation was related to this season

West Azerbaijan province is surrounded by three areas of different watersheds including the Urmia Lake, the Caspian Sea, and the Mesopotamia rivers. The Godar River in Naghadeh is considered the internal basin of the Urmia Lake, which belongs to Ponto-Aralo Caspian ecology due to having indicators of Ichthyophonus in Caspian Sea watershed, which is also affiliated to a larger Palaearctic ecology. The infestation of fish species to the given parasites in Godar River in Naghadeh reaffirms previous researches results based on the extent of the parasite infestation. On the other hand, a closer look on the research results highlights a few foremost points. First, the infestation of *Cyprinus carpio* to *Diplostomum spathaceum* refers to the specific ecological and biological condition of Godar river in Naghadeh because the ecosystem due to including all the hosts of these parasites (snails as the first intermediate hosts, and fish as the second and the birds, especially heron birds as final hosts) have provided a favorable environment to complete the parasite cycle.

The *Cyprinus carpio* family had the highest infestation rate, which is due to the biological and physiological structure of such fishes, which provides the condition for *Diplostomum Spathaceum* Metacercar to infiltrate the skin and gills. Besides, the *Cyprinus carpio* food habits and their biological status in the water column (mostly living in bed or near aquatic ecosystems) is involved in this regard. Such a phenomenon is reported by Kritscher (Kritscher, 1983) among fishes in Neusiedlersee Lake. *Diplostomum spathaceum* Metacercariae as the only Digenea parasite has caused severe specific contamination including eyeball abnormality, blood circulatory disorders and projection in eye longitudinal axis that have been reported to be brought about by this parasite (Gratzyk, 1991; Mokhayer, 1995). The development of modern intensive fish farms has amplified the fish production for human consumption and new

Table 1. The parasitic infestation of Cyprinus carpio at Godar River (Naghadeh city of Iran)

Host Scientific name	Parasite name	Infected organ
Cyprinus carpio L.	*Diplostomum spathaceum* (metacercaria stage) R.	Eyeball
	Lernaea cyprinacea L.	Skin
	Caryophyllaeus laticeps	Intestine
	Dactylogyrus extensus Mueller & van	Gills
	Ligulla intestinalis L.	Abdominal area

products. However, the dense and excessive aquaculture has caused different species of parasitic absorption, which has threatened the fish health (Hakalahti and Valtonen, 2003), but such symptoms were not observed in this study.

Among the *Termatode monogenea*, one of the species observed in this study is *Dactylogyrus extensus*, which is more pathogenic than their same family and the species attaches themselves to the gill middle and secondary lamella with its strong clips and causes proliferation and severe respiratory mucus secretion with mechanical stimulation that disrupts gill gas exchange (Papema, 1964).

D. extensus highly prevails among the population of *Cyprinus carpio* while in the Caspian region the D.vastator has a soaring prevalence. It can be proven that due to the *D. extensus* resistance to the changes in oxygen, Ph and temperature, it can survive the undesirable environmental conditions of the Khuzestan province which is also approved by Bauer. Such a condition has been observed to dominate the Urmia watershed so that the *Cyprinus carpio* of the present study in Godar River in Naghadeh were only infected to *D. extensus*. It appears that *D. vastator* was highly sensitive to environmental factors. The *D. hypophthalmichthys* species was previously reported by Jalali and Molnar in Farmed *Hypophthalmichthys molitrix* in Gilan province (Jalali and Molnar, 1990).*Ichthyophthirus multifflarfs* was isolated from fish skins and gills and evaluated. This protozoan parasite of freshwater fish is among the most dangerous types of parasites. Infestation with this protozoan in most freshwater fish has been reported in most parts of the country.

Based on some investigations the primary host of this protozoan is *Cyprinus carpio*, but they can contaminate all freshwater fish in the environment temperature range that the parasite lives. In severe infestation, low-colored gills, sunken eyes and spilled claws, which eventually lead to infested fish death. In some samples autopsy, fish kidneys and spleens were large and swollen and the liver was pale and spotted. Another parasitic crustacean of fishes observed in Iran is *Ergasilus*. It includes over 80 species of parasites in the freshwater and sea. Their general body shape is similar to Cyclopses and their head is considerably large (Jalali, 1998). Some species of this kind have been reported to exist in common Cyprynidae, Barbus sharpeyi, Barbus luteus, aspius vorax in Huralazim wetlands (Fernando *et al.,* 1972; Papema, 1964; Rahmani *et al.,* 2012a; Rahmani *et al.,* 2012b; Rajan and Revathi, 2011; Ranjan, 2011; Ozoko, 2012).

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