Ectoparasite infection of *Carassius carassius* in water resources of west Azerbaijan, Iran

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Received: January 2011 Accepted: July 2011

Abstract

Various parasite species were found in *Carassius carassius* including *Diplostomum spathaceum*, *Dactylogyrus* sp.,*Gyrodactylus* sp. *Ichthyophthirius multifiliis* and *Trichodinia* sp. They were found in four rivers in West Azerbaijan Province (North-Western Iran). A total of 207 live *Carassius carassius* from four rivers including Aras (72); Zariyneh (42); Nazlo (58) and Barandoz (35) were studied. Parasitological surveys were carried out on gills and external organs. The results showed that *Diplostomum spathaceum* (70.83%); *Dactylogyrus sp*. (38.88%); *Gyrodactylus sp.*(22.22%); *Ichthyophthirius multifiliis* (48.61%); *Trichodinia sp.* (8.33%); *Chilodonella sp.* (12.50%) and *Argulus sp*. (76.19%) were found in fish from Aras Rive so that the result showed, *Spathaceum* (63.79%); *Dactylogyrus* sp. (36.20%); *Gyrodactylus* sp. (25.86%); *Ichthyophthirius multifiliis* (44.82%); *Trichodinia sp*. (18.96%); *Chilodonella* sp. (12.06%) and *Argulus* sp. (6.89%). Argulus prevalence was greater in Barandoz River while Chilodonella in Zariyneh rud River. In Barandoz River, *Diplostomum spathaceum* (65.71%); *Dactylogyrus* sp. (37.14%); *Gyrodactylus* sp. (22.85%); *Ichthyophthirius multifiliis* (31.42%); *Trichodinia* sp. (25.71%); *Chilodonella* sp. (8.57%) and *Argulus* sp. (5.71%) were reported, respectively. Finally, in Zariyneh rud river, the followings have been reported: *Diplostomum spathaceum* (76.19%); *Dactylogyrus* sp. (21.42%); *Gyrodactylus* sp. (14.28%); *Ichthyophthirius multifiliis* (52.38%); *Trichodinia* sp. (23.80%); *Chilodonella* sp. (14.28%) and *Argulus* sp. (7.14%). It should be noted that prevalence , intensity and host parasite relationship will be discussed in details in this article.

Keywords: *Carassius carassius*, Ectoparasite, Water resources, Iran

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[DOR: 20.1001.1.15622916.2012.11.1.19.5]

Introduction

With an area of over 43,660 square kilometers, the province of West Azerbaijan is located in the north-west of Iran. This province shares a long border (805 km) with the countries such as Nakhjavan, Armenia, Azerbaijan, Turkey and Iraq. According to existing meteorological data, temperatures/climates vary within this province. Using the method of *EmbergerByvklymanyk Gvsn*, the meteorologists divide the climate into cold and semi-arid. West Azerbaijan is abundant with water resources of the country's northern territory, so it has a great water potential. In this province, water resources are as follow: *Lake Urmia*, the largest lake inside Iran, *Zarine* River, *Symynh* River, *Mahabad*, *Barandvz River*, *Shhrchayy*, *Zngmar*, *Nazlorivers*, *Zola* River, and *Gotor*, *Aras*, *Godard* and *Lavigne* River. Also, fisheries have a high economic value in Aras *River*, *Nazloand Barandoz River* and *Zarine River* from among the afore-mentioned water resources.

A vast majority of literature on Parasitology information of water resources in West Azerbaijan province has been reported. For example, Jabari (1988-1989) studied cases of infants with a black eye fish Diplostomum parasite in Mahabad River. In the same token, Brotherhood's study (1990-1991), with the black fish contamination of Mahabad, Zahiri Maleki (1993) and Ahmad (1993-1994) studies on parasites and breeding establishments. Zaki Khani (1994) detected contamination of crustaceans and leeches in the river and pours Zargham Zarine River Parasites. Raphi's study on dascaris acus bothriocephalus acheilognathi is another example. Nikzad's (1994) geological study on D.Spathacoum in Zarine River goes on Meshkini and a few articles (2006-2011). Also, Khodadadi and Rasuli (2009-2010) attempted to evaluate fish parasites in the eye at Mahabad University. The aim of this study was to determine the distribution of parasites in *C.carassius*, in west Azarbaijan water resources.

Materials and methods

Inspired by the studies done by Berg (1965), Coad (1992), Yarshater (1988) and Abdoli (1999), the identification of fish hosts was carried out. The fish samples were prepared through the rivers which are given in the table 1. Consequently, Whole specimens were then fixed in 4% formalin and transferred to the Laboratory of Parasitology of Islamic Azad University of Urmia for the following processes. The methods used for collecting, fixing, staining, and mounting of parasite specimens were reported as follows: For detecting protozoa, the mucus was scraped (separately from skin and gills) and placed in a micro slide. Mucus was spread carefully with a cover slip. The protozoa were subjected to a fixative for about 15 minutes. They were then washed out for several minutes in alcohol containing a drop Iodine solution added to it according to Fernando et al. (1972).

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Table1: Important Rivers of West Azarbaijan province

River	Average of annual flow of the MCM	Average of annual discharge	Length (Km)
Zarine*	2062.92	63.85	177.5
Symyneh	525.79	16.6	75
Nazlo	398.5	12.47	53.75
Barandoz*	268.54	8.45	40
Zingmar	219.20	6.88	53
Mahabad	198.66	6.29	37.5
Gotor	187.55	5.88	71.25
Shaharchay	185.63	5.42	25
Zola	150.53	4.81	41.25
Aras*	-	1300	1072
Godar	55.17	1174	38
Lavigne	8.77	0.25	27.5

Regarding Monogenea, fish gills were cut out and examined under a microscope at x40-100 magnification. Vigorously moving worms were separated from the gills with a pipette and fixed under a cover slip according to Fernando et al. (1972) and Gussev (1983) in ammonium picrate and glycerol-gelatine, respectively. Digenea: Metacercaria were collected in a 0.6% saline solution. The sample was placed with a little saline on a glass slide and appropriate pressure was applied. It was fixed with 90% alcohol and washed in 70% alcohol and then stained with alum haematoxylin according to Fernando et al. (1972). Permanent mounts were made by using carminestains according to Fernando et al. (1972) and Roberts (2001). The identification of parasites was carried out in accordance with the keys given by Gussev (1985), Lom and Dykova (1992), Jalali (1998) and Raissy et al. (2010).

Results

As can be shown in tables 2, 3, 4 and 5, seven species were found in *Carassius carassius* in four selected rivers. Three types of the parasites belong to protozoan, three other types of them belong to monogena parasite and one genus was *Argulus* sp.

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Table 2: Parasitic fauna in *C.carassius* in Aras River

parasite	No. of fish Examined	No. of fish infected	Infected organs	Range	Prevalence %	Intensity (Mean±SE)
D. spathaceum	72	51	lens	۱-۶	70/83	±0.55۲,۸۸
Dactylogyrus sp.	72	28	Gills	2-15	38/88	±0.42۷,۳۷
Gyrodactylus sp.	72	16	Gills skin	۳-۱	22/22	±0.3۱,۸۸
Trichodina sp.	72	18	Skin gills	2-35	25	11.88±0.95
Ichthyophthirius multifiliis	72	35	Gills skin	2-11	48/61	±0.56۶,۲
Chilodonella sp.	72	6	Gills skin	1-5	8.33	2.5±0.45
Argulus sp.	72	9	Skin Gills	1-2	12/50	1.43±0.2

Table 3: Parasitic fauna in *C.carassius* in Nazlo River

parasite	No. of fish Examined	No. of fish infected	Infected organs	Range	Prevalence %	Intensity (Mean±SE)
D.spathaceum	58	37	lens	1-4	63/79	2.2±0.49
Dactylogyrus sp.	58	21	Gills	1-2	36/20	1.5±0.5
Gyrodactylus sp.	58	15	Gills	1-3	25/86	±0.58۲
Trichodina sp.	58	11	Skin Gills	1-8	18/96	±0.57۳,۲
Ichthyophthirius multifiliis	58	26	Gills skin	2-5	44/82	3. 7±0.88
Chilodonella sp.	58	7	Gills skin	1-3	12/06	1.8±0.3
Argulus sp.	58	4	skin	1-2	6/89	±0.1۱,۲

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Table 4: Parasitic fauna in *C. carassius* in Zariyneh rud River

parasite	No. of fish Examined	No. of fish infected	Infected organs	Range	Prevalence %	Intensity (Mean±SE)
D.spathaceum	42	32	lens	1-4	76/19	3.4±0.88
Dactylogyrus sp.	42	9	Gills	1-2	21/42	7.2±0.56
Gyrodactylus sp.	42	6	Gills skin	1-3	14/28	2.9±0.5
Trichodina sp.	42	10	Skin gills	1-9	23/80	1.4±0.3
Ichthyophthirius multifiliis	42	22	Gills skin	2-4	52/38	2.4±0.4
Chilodonella sp.	42	6	Gills skin	1-3	14/28	1.7±0.5
Argulus sp.	42	3	Skin Gills	1-2	7/14	2±0.8

Table 5: Parasitic fauna in *C. carassius* in Barandoz River

parasite	No. of fish Examined	No. of fish infected	Infected organs	Range	Prevalence %	Intensity (Mean±SE)
D. spathaceum	35	23	lens	۵۱-	65/71	±0.4۱،۸
Dactylogyrus sp.	35	13	Gills	2-15	37/14	10.8±0.85
Gyrodactylus sp.	35	8	Gills skin	۳-۱	22/85	±0.5۵،۲
Trichodina sp.	35	9	Skin gills	2-15	25/71	2.1±0.45
Ichthyophthirius multifiliis	35	11	Gills skin	2-8	31/42	1.6±0.5
Chilodonella sp.	35	3	Gills skin	1-5	8/57	2±0.8
Argulus sp.	35	2	Skin Gills	1-2	5/71	3.1±0.57

Discussion

In the case of parasites, the identification of wild life of the rivers was significant in order to understand ecological relationships between host and pathogens, which should be taken into account for fish hatchery and breeding. Wild fish parasites, especially those that were less than host specificity may contain a wide host range of potential risks in aquaculture due to high stocking density and stress formation in case of free forms that enter the pool and /or with the host fish that under stress conditions become dense and multiply rapidly, causing epidemics in fish

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breeding. A few parasites species like protozoa are apparently non- host specific species and have been found in a wide range of fresh or brackish water fish species throughout the world. In this study three protozoans, *Ichthyophthirius moltifiliis, Trichodina and chilodenella* are reported. Among them, *Ichthyophthirius moltifiliis* with high prevalence is a very dangerous parasite. *Diplostomum spathaceum* is a very common parasite in the freshwater fishes of Iran (Jalali, 1998). Moreover, it has been frequently reported from fishes in different areas of Iran (Masoumian, 2001; Pazooki, 2007; Barzegar et al., 2008; Azadikhah et al, 2009; Raissy et al., 2007, 2010b).

The results of the present study show that the incidence of *Diplostomum spathaceum* in the study area is very high. According to Gibson et al (1996), species of Dactylogyrus are primarily (c. 95%) parasites of the gills of cyprinids fishes, but all Dactylogyrus species found in Iranian fishes are specific to Cyprinids fish (Jalali, 1995 and Jalali et al 2000). In this study, we found *Dactylogyrus* sp. from the gills of *Carassius carassius*. Crustaceans are even less well studied in Iran, though Mokhayer (1981) and Jalali (1998) studied different crustaceans shown to genus level. Abdi (1997) and Mirhashemi and Pazooki (2003) identified five Crustacean species. *Argulus foliaceus* was reported on the skin of common carp in Anzali lagoon in Caspian basin (Asadzadeh Mangili et al, 2000) and on some cyprinid fish species in Zarivar Lake and also in various parts of Iran (Jalali and Barzegar, 2006 ; Asadzadeh Mangili et al., 2000). In this study *Argulus* sp. is a crustacean parasite which was found on the skin and gills of *Carassius carassius*. A relatively extensive study on fish parasites has been done in the world but the breadth and depth of studies in the former Soviet Union was more than other countries. The use of water resources for fish breeding and introducing them to the epidemic particularly in parasitic diseases has followed one of the main motivations for doing this study (Azadikhah, 2009). In the last decade, such studies have been carried out but the research related to parasites of freshwater fish species, mainly confined to the carp family fish that is about 70 percent of freshwater fish in Iran. One of the findings of this study is the changes in diversity of fauna and the percentage of parasitic infection in the River. Regarding the necessity and importance of *D. spathaceum* disease in the past years, various studies have been carried out, and due to these parasite studies of *D.spathaceum* range of hot water and cold water fish, even sturgeon has been infected. It has been found that Parasite *D. spathaceum* had 105 species of fish in the eye lenses and can be concluded that although this parasite lacks host specificity, life is very dependent on the position of the fish eye. There are many known literatures by Jalali (1987), Gorbanzadeh (1995), Aragi Sura (1996) and Azadikhah (2009) on indigenous fish of the river flowing water ecosystems belonging to the Urmia Lake basin, which the ecology of the area is affected by its

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Ponto - Aralo – Caspian (Coad, 1992). In the other words, monogena parasites that have been found in native fish of the rivers are parasites of other fish in waters that once the Russian researchers detected in this area. So understanding the value of parasites zoogeography is necessary.

As seen in table. 1 showing parasite prevalence and intensity in the same species in different rivers was close to each other in all cases. The conclusion shows similar distribution of studied parasites in *Carassius carassius* throughout this study.

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بررسی فون انگلی ماهی کاراس در آب های استان آذربایجان غربی

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چکیده :

در طول طی این بررسی ۴ بار صید از سال ۱۳۸۸ تا ۱۳۸۹ در مجموع ۲۰۷ عدد ماهی کاراس (*Carassius carassius*) با استفاده از تور ماهیگیری و الکتروشوکر از رودخانه های منابع آبی شمال استان آذربایجان غربی رودخانه ارس و از منابع آبی بخش مرکزی استان رودهای نازلو و باراندوزچای و از منابع آبی جنوب استان زرینه رود که دارای ارزش شیلاتی و اقتصادی بالای می باشند بررسی گردیدند ، که از آبششهای ماهیان کاراس رودخانه ارس ژیروداکتیلوس (*Gyrodactilus* sp) که از رده منوژنها و از دیژنه آ یک گونه از جنس دیپلوستوموم (Diplostomum spathaceum) از چشم تمامی ماهیان کاراس استان (در رودخانه های مورد مطالعه) و از گونه eustrongylides جنس E.excisus در محوطه بطنی ماهیان کاراس و و از بیاریها و انگل های قارچی .sp *Trichodinia* و .sp *Chilodonellasis* از ماهیان کاراس شمال استان معرفی گردیدند. همچنین انگل دیپلوستوموم برای فون انگلی ماهی کاراس در کل استان آذربایجان غربی معرفی گردید. براساس نتایج بدست آمده ۶۹,۱۳ درصد از کل ماهیان مورد مطالعه به انگل دیپلوستوموم آلوده بودند که نشان دهنده در صد بالای آلودگی در ماهیان این منبع آبی می باشد

واژگان کلیدی : انگل ، دیپلوستوموم ، ژیروداکتیلوس ، ماهی

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