Parasitic fauna of Gobiidae in Mazandaran coastal zones, north of Iran 2011

Mohammad Reza Youssefi ·
Reza Habibnejad Roushan ·
Seyed Mehdi Hosseinifard

Received: 30 November 2013 / Accepted: 20 May 2014 / Published online: 22 June 2014
© Indian Society for Parasitology 2014

Abstract Gobiidae is considered as one of the diverse families of fishes in Caspian Sea. Due to abundant species and no harvest, this family plays an important role in ecology and feed chain of fishes in Caspian Sea. Present study was performed to determine parasitic fauna of Gobiidae in southern parts of Caspian Sea (coasts of Nowshahr, Sorkhrood, Jouybar, Sari and Amirabad). Primarily, length and weight of each fish was measured. Then, fish's various organs were examined by routine parasitology methods. From 150 fishes which were caught from six studied coastal zones, 51 (34 %) were infected. Majority of caught fishes was belonged to sand goby (*Neogobius fluviatilis pallasii*) and round goby (*Neogobius melanostomus*) was the least. Highest rate of infection was seen in *N. fluviatilis pallasii* while, this percentage in round goby (*N. melanostomus*) was low (8.57 %) and in Caspian bighead goby (*Neogobius kessleri gorlap*) no parasitic infection was observed. Most of infected fishes were from Jouybar coastal zone while Nowshahr coastal zone had the lowest infection rate. In present study parasites such as *Dactylogyrus*, *Rhobdochona fortuneti* and *Bothrocephalus gowkogensis* were diagnosed in Caspian gobies. Regarding importance of gobies in chain feed of other fishes and their

indirect economic importance, need of diagnosing of gobies parasitic fauna seems to be essential.

Keywords Gobiidae · Parasites · Caspian Sea · Mazandaran · Iran

Introduction

Caspian Sea is limited to Russia from north, to Azerbaijan from west, Turkmenistan and Kazakhstan from east and south is Iran (Fig. 1). Important resources of this lake are petroleum and gas in seabed of lake and also Sturgeon fish. Average depth of this lake in northern parts is less and approximately 10 m, in mid parts it is 180–788 m and in southern parts near Iran it reaches 960–1,000 m. This lake is the greatest lake of the world and because of it, idiomatically it is named as Sea, where is environment of world's most precious fishes. The most important rivers flows into Caspian Sea in Iran are Sepidrood, Haraz and Pilorood. This sea contains 17 families, 78 species and 49 subspecies (Shariati 2004), among them Gobiidae with 10 genus and 32 species is considered as one of the diverse families of Caspian Sea (Parviz 1991).

Important species of Gobiidae in Caspian Sea are as follows (Daghigh-Roohi and Sattari 2004): Sand goby (*Neogobius fluviatilis pallasii*), Caspian goby (*Neogobius caspicus*), Big head goby (*Neogobius kessleri gorlap*), Round goby (*Neogobius melanostomus*). Gobiidae, due to abundant species and no harvest also crude population in Caspian Sea, has an important role in general output of this sea. So that near to 40 % of Caspian seals feed and in east southern parts of Caspian Sea more than 50 % of belugas feed are provided from gobies (Rahim 1991).

M. R. Youssefi
Department of Veterinary Parasitology, Islamic Azad University,
Babol Branch, Babol, Iran

R. H. Roushan
Young Researchers Club, Faculty of Veterinary Medicine,
Islamic Azad University, Babol Branch, Babol, Iran

S. M. Hosseinifard (✉)
Department of Aquatic Animal Health, Islamic Azad University,
Babol Branch, Babol, Iran
e-mail: sm_hosseinifard@yahoo.com

Fig. 1 Map of Caspian Sea **Table 1** Length of gobies in six studied regions, 2011

Studied regions	Amirabad	Sari	Jouybar	Babolsar	Sorkhrood	Nowshahr
Length (cm)	8.01 ± 2.79	8.78 ± 2.34	9.39 ± 2.8	9.25 ± 2.24	7.88 ± 1.44	8.05 ± 2.29

Present study primarily aimed to identify parasites species of Gobiidae of Caspian Sea and their hosts' domain and prepare an appropriate context for further studies on mutual relationship between parasites and fish, also probable impact of parasitic contamination on fish supply of Caspian Sea.

Materials and methods

This study was done during June–September of 2011. Fishes were caught by local fishermen by means of fishing tour and hook, and then with the help of an oxygen capsule and especial tanks, fishes were transported to parasitology laboratory of veterinary faculty alive. After delivery to laboratory, fishes were removed from tanks and euthanized by stabbing a needle in occipital joint then fishes were immobile and characteristics such as total length, standard length and weight were recorded.

Parasitological studies were done by stereoscope (magnification 4x–2) and examine macroscopic gross lesions on skin, fins and gills. Then by sampling from skin, fins, gills and eyes of fishes, microscopic examination was done. Samples were observed by 40–100 magnifications for detecting parasites in them. Parasitological checking was also done on peritoneal cavity and alimentary tract.

For this purpose, first 2 incisions, one from proximal of anus to below of gills cover and another in parallel with lateral line to gills cover were performed. After that, all of internal organs such as liver, kidney and spleen were examined by stereoscope for existence of parasitic cysts and nematode infections.

Diagnosis and identification of protozoan parasites were done by Lom and Dykova (1992), Jalali (1998), monogen

parasites by keys of Bychovskaya (1964), Gussev (1985), Jalali (1998) and nematode parasites by Moravec (1994), Bychovskaya (1964) Jalali (1998).

Statistical method

Statistical analysis was done by Chi square method.

Results

Data obtained from analysis of six coastal zones considering length of obtained fish are shown in the Table 1. According to length, no significant difference was seen in these regions ($P > 0.05$).

In present study 150 gobies were caught from six different regions. About 34 % of all 51 were contaminated to parasites. Prevalence of parasitic contaminations in six different regions is shown in Table 2 for each region separately. As can be seen, from each region 25 fishes were caught, majority of them was belonged to sand goby species. Maximum number of infected fish was belonged to the same species. Also prevalence of *Dactylogyrus* and nematodes is shown in Table 2. Most of nematode infections were caused by *Rhabdochona fortunetti*, which was in its highest prevalence in Jouybar while Sorkhrood coastal zone was free of it. Infected organs in sand gobies were gills and intestine and in bighead gobies were intestine. Maximum infected fishes were seen in Jouybar coastal zone and minimum in Nowshahr.

Figure 2 shows percentage of parasitic infections in Caspian gobies in different studied regions. As can be seen prevalence of parasitic infection in *N. pallasi* in Amirabad

Table 2 Prevalence of parasitic infections in Caspian gobies in six different studied coastal zones in 2011

City	Genus of fish	Total number of fishes	Infected fishes	Dactylogyrus	Nematode
Nowshahr	<i>Neogobius pallasii</i>	17	3 (12 %)	0	3 (12 %)
	<i>Neogobius melanostomus</i>	3	0	0	0
	<i>Ponticola gorlap</i>	5	1 (4 %)	0	1 (4 %)
	Total	25	4 (16 %)	0	4 (16 %)
Sorkhrood	<i>Neogobius pallasii</i>	15	1 (4 %)	0	0
	<i>Neogobius melanostomus</i>	3	0	0	0
	<i>Ponticola gorlap</i>	7	0	0	0
	Total	25	1 (4 %)	0	0
Cestodes					
Babolsar	<i>Neogobius pallasii</i>	12	8 (32 %)	1 (4 %)	7 (28 %)
	<i>Neogobius melanostomus</i>	4	0	0	0
	<i>Ponticola gorlap</i>	9	1 (4 %)	1 (4 %)	1 (4 %)
	Total	25	9 (36 %)	2 (8 %)	8 (32 %)
Jouybar	<i>Neogobius pallasii</i>	21	16 (64 %)	3 (12 %)	14 (65 %)
	<i>Neogobius melanostomus</i>	1	0	0	0
	<i>Ponticola gorlap</i>	3	0	0	0
	Total	25	16 (64 %)	3 (12 %)	14 (56 %)
Sari	<i>Neogobius pallasii</i>	12	5 (20 %)	0	5 (20 %)
	<i>Neogobius melanostomus</i>	3	0	0	0
	<i>Ponticola gorlap</i>	10	1 (4 %)	0	1 (4 %)
	Total	25	6 (24 %)	0	6 (24 %)
Amirabad	<i>Neogobius pallasii</i>	23	11 (44 %)	0	11 (44 %)
	<i>Neogobius melanostomus</i>	1	0	0	0
	<i>Ponticola gorlap</i>	1	0	0	0
	Total	25	11 (44 %)	0	11 (44 %)

Fig. 2 Parasitic contamination in two species of Caspian gobies in studied coastal regions, 2011

coastal zone was the highest while parasites were more prevalent in *P. gorlap* in Babolsar. Totally parasitic infection in *N. pallasii* was more than *P. gorlap*.

Discussion

Regarding parasitic fauna, maximum of prevalence was belonged to nematodes. This is probably because of intermediate hosts such as polychaete and oligochaete worms (Daghigh-Roohi and Sattari 2004), presence of

migratory birds and easy access of aquatic birds to vast expanse of seas (Ondrackova et al. 2010), and feeding diet (Daghigh-Roohi and Sattari 2004). In present study on infection to nematodes, this kind of infection was only seen in sand goby and bighead goby, infection rate in sand goby was more and majority of prevalence was belonged to nematode of *Rhobdochona fortuneti*. This study by evaluating relation of length and infection rate revealed that more prevalence of parasitic infections was seen in fishes with more length. In present study low prevalence of Dactylogyrus in Caspian Gobiidae can revealed this fact that this family of fish in Caspian Sea is somehow resistant to mentioned parasite, unless limited number of this kind of infection in sand gobies which was probably due to utilizing other fishes as feed or contact with infected fish. Considering presence of infection to cestodes just found in one fish caught from Sorkhrood coastal zone, it can be concluded that infection to cestodes in Caspian gobies are rare and it can be known as an emerging infection caused by contaminated feed. From whole of studies (especially in Iran) done on gobies, few of them reported presence of cestodes in Gobiidae (Abdollahpour Biria et al. 2010). Evaluations showed that prevalence and severity of

parasitic contaminations are affected by different geographical locations and aquatic ecosystems (Ondrackova et al. 2010; Sattari et al. 2002; Rolbiecki 2006) which can be seen obviously in present study, as different studied locations had distinct difference in prevalence and intense of each parasite. In general, prevalence of parasitic contamination in Jouybar coastal zone was more than other regions and in Sorkhrood it was less. *Dactylogyrus* contamination was only seen in Jouybar and Babolsar coastal zones while gobies of other regions were free of this parasite. Also, regarding nematodal contamination despite Sorkhrood which was free of parasite, other regions were contaminated and maximum was belonged to Jouybar zone.

Since gobies are assumed as one of the main choices in feed chain of sturgeons and regarding findings of present study which showed prevalence of nematode infections among Caspian gobies, it can be attributed as a cause of sturgeons' contamination, feeding contaminated gobies. Apart from economical issue, one of the important subjects in this field is transmission of some common fish and man parasites such as *Anisakis* sp. which is a serious risk for man and also Caspian seal health, a precious and endangered species of mammals in Caspian Sea.

Conclusion

It can be said that prevalence of parasitic diseases in intermediate host fishes are increasing however these fishes are not economically important, because of importance of them in chain feed of other fishes, need of diagnosing of gobies parasitic fauna seems to be essential.

References

- Abdollahpour Biria H, Abbasi K, Sarpanah AN (2010) Studying distribution of sand goby, *Neogobius fluviatilis pallasii* (Gobiidae) in the South-West coast of Caspian sea (Guilan province). *J Biol Sci* 14:15–27
- Bychovskaya BE (1964) Key to the parasites of freshwater fishes of USSR translation from Russian by palestine program for scientific translation. Jerusalem 3:42–49 (In Russian)
- Daghigh-Roohi J, Sattari M (2004) Occurrence and intensity of parasites in some gobiids (Perciformes: Gobiidae) from the Southwest of the Caspian Sea. *J Fac Vet Med* 59(1):17–22
- Gusse AV (1985) Parasitic metazoans: class Monogenea. In: Bauer ON (ed) Key to the parasites of freshwater fish fauna of the USSR, vol 2. Nauka, Leningrad, pp 1–424 (In Russian)
- Jalali B (1998) Parasites and parasitic diseases of Iranian freshwater fishes. 1st edn. Iranian Fisheries Company, 562 (In Persian)
- Lom J, Dykova I (1992) Protozoan parasites of fishes. Developments in aquaculture and fisheries science, vol 26, 1st edn. Elsevier Science, Amsterdam, p 316 ISBN 13: 978-0444894342
- Moravec F (1994) Parasitic nematodes of freshwater fishes. Kluwer Academic Publishers, London, p 473. ISBN: 9788020004826
- Ondrackova M, Francova K, Davidova M, Matej P, Jurajda P (2010) Condition status and parasite infection of *Neogobius kessleri* and *N. Melanostomus* (Gobiidae) in their native and non-native area of distribution of the Danube River. *J Ecol Res* 25:857–866
- Parviz HA (1991) Caspian gobiidae, gobiidae family. *Aquat J* 12–13:36–39
- Rahim FDBA (1991) Caspian gobiidae. Ph.D Thesis, Caspian Sea Teleosts Fishes Research Center, Bandare Anzali
- Rolbiecki L (2006) Parasites of the round goby, *Neogobius melanostomus* (Pallas, 1811), an invasive species in the Polish fauna of the Vistula Lagoon ecosystem. *Oceanologia* 48:545–561
- Sattari M, Shafii S, Daghigh-Roohi J (2002) Occurrence and intensity of *Eustrongylides excisus* (L.) (Nematoda: Dioctophymidae) from some bony fish species in the Caspian Sea and its basin. *J Fac Vet Med* 57(1):37–41 In Persian
- Shariati A (2004) Fishes of Caspian Sea and its basin. Naghshe Mehr Publications, Tehran, p 205