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Investigation of Infected Gill to Monogenea in Sturgeon at the Southern Part of the Caspian Sea

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Abstract: A parasitological investigation on the gill of Acipenseridae fish in the southern part of the Caspian Sea (Iran) was undertaken. Altogether, 100 specimens were examined. The fishes included to this study are considered as *Acipenser persicus* (Persian Sturgeon, 24 specimens), *A. stellatus* (76 specimens), *A. gueldenstaedti* (1 specimen) and *A. nudiventris* (2 specimens). During this study two gill monogenes were revealed: *Nitzschia sturionis* and *Diclybothrium armatum*. Sturgeons were caught by gill net from a fishing ground located at Khazar abad in Sari, province Mazandaran, Iran. The biometric data of the fishes were recorded. The prevalence of infection was also studied. All fish specimens examined during this study were collected from their natural environment. Prevalence Mean intensity, Abundance and Dominance were determined. Higher this factors observed at *Acipenser stellatus* than others species ($P<0.05$). *Nitzschia Sturionis* showed infection lower than *Diclybothrium armatum* in species.

Key words: Sturgeon · Caspian Sea · Parasites · Monogenea

INTRODUCTION

Sturgeon (Chondrostei: Acipenseridae) are evolutionary relicts with distribution in the northern hemisphere. Their status as basal actionopeterygian fishes, their unique benthic specialization and variation in their basic diadromous life history make sturgeon interesting biological and biogeographical subjects. Extensive studies on Eurasian sturgeon indicate that they are also unique among fishes, in possessing a markedly diverse assemblage of host-specific parasites. The parasites of sturgeon have been studied by several authors [1, 2]. However, there are only a few reports about such parasites in the southern part of the Caspian Sea. Mokhayer [2] studied parasites of three sturgeon species, including *Acipenser stellatus*, *A. gueldenstaedti* and *Huso huso* and reported parasite species from all of them.

The monogenea is a class of platyhelminths parasitic mostly on external surfaces and gills and oral cavity of freshwater and marine fish. The capsalidae are monogeneans parasitizing skin, fin and gill of marine fishes. The host range comprises elasmobranches (shark and batoids, Whittington and Chisholm [3] and teleosts including primitive sturgeons [4]. Because of their direct life cycle, some monogeneans can affect fish in captivity [5]. There are increasing reports that some monogeneans adversely affect fish in aquaculture and are even responsible for epizootic events [4]. In sturgeon, the monogenean, *Nitzschia sturionis* and *Diclybotrium arumatom* causes import infection. Additionally, the method that *N. sturionis* and *D. arumatom* uses to attach the fish's gill, injures the gill tissues, which may facilitate secondary infections with other pathogens (e. g. bacteria or viruses [4-7] causing yet more economic dangers. This study investigates infection of gill to monogenea in sturgeon at the southern part of the Caspian Sea.

MATERIALS AND METHODS

A total 100 samples of four sturgeon species (including *A. stellatus, A. periscus, A. guldenstaedti* and *A. nudiventris*) were collected. The samples included sturgeons which were caught in fisheries section. After caught and recording biometric characteristics (Table 1). Standard parasitology methods were used. After removal gill, both (right and left) named. Moreover, branch of gill put in Petri dish that included water

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Table 1: Biometric characteristics (weight, forked length, total length and weight of caviar)

Fish characteristics	Weight (Kg) range Mean ± SD	Forked length (cm) range Mean ± SD	Total length (cm) range Mean ± SD	Weight of caviar (Kg) range Mean ± SD
A. stellatus	3.5-15.3	103-149	119-163	0.9-3.7
N=76	9.125±2.312	124.779±9.345	140.688±9.77	1.85±0.54
A. periscus	10-30	134-182	120-160	6.4
N=21	17.061±4.73	154.94±14.22	138.28±12.68	
A. guldenstaedti	32-59	165-207	176-228	6.9-11.1
N=1	45.5±19.09	186±29.69	202±36.76	9±2.96
A.nudiventris N=2	9.5	111	128	-

because parasites move from arch of gill in water. At the end, parasite separate and calculate separately. Standard statistical computation (mean intensity, standard deviation, prevalence, abundance and dominance) were carried out using Microsoft Excel (Office 2003). The differences between groups were determined by Z test and ANOVA test ($P<0.05$). The dominance of parasite species was calculated as N/N-sum (where N is the abundance of parasite species and N-sum is the sum of the abundance of all parasite species found) and expressed as a percentage. Mean intensity was determined by dividing the total number of recovered parasites with the number of infected fish samples, while abundance was calculated by dividing the total number of recovered parasites with the number of (infected and uninfected) fish samples. Prevalence was also calculated by dividing the number of infected fish samples with the total number of examined ones and expressed as a percentage.

RESULTS AND DISCUSSION

In this study, 128 worms of 2 species including monogenea (*Nitzschia sturionis* and *Diclybotrium arumatom*) were found from gill in the four sturgeon species. The prevalence, mean intensity, rang abundance and dominance of parasites are presented in Table 2.

As shown in table 2, 95 gill worms of four species were found in 76 samples *A. stellatus,* 29 gill worms of 21 samples *A. periscus,* 4 gill worms of 2 samples *A. nudiventris*, 4 gill worms of 1 samples *A. guldenstaedt.* In this study, 100 samples of four sturgeon species were examined and more than 128 gill worms of 2 species, including monogenea were found. There are few reports about parasites of sturgeons in Iran. Mokhayer [2] studied parasites of sturgeon species. In the present investigation, attempts were made to carry out a comprehensive study on gill parasites of four sturgeons which inhabit the southern part of Caspian Sea. *D. arumatom* were the most prevalent gill warms of sturgeons. Also, the mean intensity, abundance and dominance of this parasite were more than the other. However, some differences were found among the sturgeon. The number of parasites in *A. stellatus* was more than in the others (probably because of wide variety of food items, including crustaceans, mollusks and also fishes in its diet). According to the obtained resultd of this study and also those of Mokhayer [2] and Gorogi [8], the diversity of parasites of sturgeon in the southern part of Caspian Sea is less than that in the northern part.

Table 2: Prevalence, mean intensity standard deviation (SD), range (minimum and maximum number), abundance and dominance of parasites

Fish	Prevalence (%)	Mean intensity	Range	Abundance ± SD	Dominance (%)
A. stellatus					
N. sturionis N=20	21.05	1.66±0.98	1-4	3±3.82	54.05
D. arumatom N=75	78.94	2.69±3.09	1-14	4±4.81	78.94
A. periscuse					
N. sturionis N=11	37.93	1.52±0.81	1-4	2±1.3	29.72
D. arumatom N=18	62.06	3.33±1.36	2-5	3	18.94
A. guldenstaedti					
N. sturionis N=3	75	3	3	1	8.10
D. arumatom N=1	25	0	0	0	2.7
A. *nudiventris*					
N. sturionis N=3	75	3	3	1	8.10
D. arumatom N=1	25	0	0	0	2.7

It should be noted that the maximum depth of the Caspian Sea in the northern part is about 12m, while in southern part it about 98m. The salinity of water in the north is about 5 ppt; while in the south it is about 5 ppt in the southeast. In addition, productivity and carbonate ions in two regions also differ. All these factors may have some impact on the parasite communities of sturgeon. It also seems that the diversity of parasites (including freshwater parasites) in the southern part of the Caspian Sea has decreased. It may relate to unfavorable conditions of fish water ecosystems, such as pollution, dam construction, etc. under condition, it will be impossible for the sturgeons to ascend into the rivers for spawning.

Due to limiting for published article at this case, this study have not compared by any study. At this study, hematology and blood biochemical parameters didn't investigate therefore we don't able to assess the effect of pollution on the studied fish. We hope that researchers do more investigations this case.

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