The Occurrence and Intensity of Eustrongylides Excisus (A Nematoda: Dioctophymidae) In Some Bonyfish Species of Caspian Sea and Its Basin

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ABSTRACT

The fishery of bony fishes has an economic importance in southern part of Caspian Sea, but there are some reports about their pathogens in this area .*Eustrongylides excisus* a parasite (Nematoda: Dioctophymidae) can damage the muscles of bony fishes . So, consumers avoid buying the infected fish. Hence, the parasite can cause economic loss.

In order to determine the occurance and intensity of the parasite, a study has been carried out on twelve fish species (no=373) including Cyprinus carpio (no=42), Esox lucius (no=60) , Carassius auratus gibelio (no=42), Abramis brama orientalis (no=50) , Perca fluviatilis (no=36), Vimba vimba persa (no=50) , Chalcalburnus chalcoides (no=50), Barbus capito (no=5) , Aspius aspius (no=5),Neogobius fluviatilis(no=14) , N.kessleri (no=12) and N.caspius(no=7).

Common parasitology procedures were used for necropsy of the fishes and recovery of the parasite. Standard statistical computations (mean, Standard Deviation, range, prevalence and dominance) were calculated for the overall samples.

***Eustrongylides excisus* (L) was isolated from *Esox lucius* (prevalence=5%, mean intensity = 5.33) and *P. fluviatilis* (prevalence= 33.3%, mean intensity= 1.5). The parasite was observed as coiled in cysts inside the muscles of these two fish species. The parasite was also isolated from the body cavity of Barbus *capito, Aspius aspius* and muscles, ovaries, body cavity, upon liver and testis of *Neogobius fluviatilis, N.kessleri* and *N.caspius*. The infection *of Barbus capito, Aspius aspius, Neogobius fluviatilis, N.kessleri, N.caspius* and perch (*P. fluviatilis*) is reported for the first time from Iran.**

Key words: Bony fishes, Caspian Sea, Parasite, Eustrongylides (L)

INTRODUCTION

E.excisus is a nematode (Nematoda: Dioctophymidae) which its larvae is very often parasitic in various species of fishes, being mostly encysted in thin fibrous cysts located in the abdominal cavity and viscera. This nematode's difinitive hosts are cormorants (*Phalacrocorax carbo, P. pygmaeus*) in which it is parasitic in the wall of the proventriculus .The aquatic oligochaetes *Lumbriculus variegatus* (Lumbricidae) , *Tubifex tubifex* and *Limnodrilus sp.* (Tubificidae) serve as the first intermediate hosts. The development of *E.excisus* involves obligate second intermediate hosts , some species of benthophagous fishes (e.g. some members of Gobiidae and Cyprinidae) acquiring infection by feeding on infected oligochaetes.An important role in the dissemination of these larvae is played by paratenic hosts, particularly predatory fishes which acquire infection by ingestion of second intermediate host (other fish) (Moravec, 1994).

The infestation of fishes with *E.excisus larvae* is sometimes very high and these parasites may be highly pathogenic to their host. These larvae do heavy damage to tissues in Acipenserids (Dogiel and Bykhovskiy, 1939). Often the complete destruction of kidneys occurs or, sometimes, inflammatory lesions are found. *E. excisus* larvae have been reported from *Acipenser*

gobiids such as *Neogobius Fluviatilis, N. kessleri* and *N. caspius*. *E. excisus* larvae are reported for the first time from these fishes in Iran.

Table 2 Destribution of prevalence, meam intensity +SD and range of examined fish.

Fish species	No. of fish	Prevalence (%)	Mean intensity + SD	Range of parasite
Cyprinus carpio	42	0	0	0
Esox lucius	60	5	5.3+7.5	1-14
C. auratus	42	0	0	0
Abramis brama	50	0	0	0
Perca fluviatilis	36	33.3	1.5+0.8	1-3
Vimba vimba	50	2.08	1+0	0
C. chalcoides	50	0	0	0
N. fluviatilis	14	35.7	8.4+10.3	1-26
N. kessleri	12	50	10.8+12.5	1-33
N. caspius	7	14.3	1	1
Aspius aspius	5	-	0	-
Barbus capito	5	-	0	-

E. excisus larvae were very long and they were found as coiled in cysts inside the muscles and also in body cavity , ovaries , upon liver and testis of the hosts .They had also rusty (bloody) appearance . So, when the consumers observe them in fish organs, they avoid consuming the fish and they throw it away. Thus, with respect to high prevalence of *E. excisus* larvae in some commercial fish species, the economic loss may be considerable. Besides, feeding sturgeons with some infected noncommercial fishes such as Gobiids, tend to transmit *E.excisus* larvae to them which may cause heavy damage of muscles and gut in sturgeons.

In the present survey, the diversity of fish species infected with *E.excisus* larvae was high which may be due to high diversity of first intermediate hosts (at least two families of oligochaetes). The big communities of second obligatory intermediate hosts (Gobiids and Cyprinids) and also high diversity of predatory fish species (paratenic hosts) have important role in life cycle of the nematode in the nature. However , it seems that the infestation of marine fish species to the *E.excisus* larvae is more prevalent than freshwater fish , since all of the five sturgeon species and also asp, barb and different gobiid species have been found to be infected with the nematode larvae but in the former study (Sattari, 1996) on ten different freshwater species (no=290), only one catfish was found to be infected with *E.excisus* larvae and also in the present study , only two freshwater fish species was found to have the parasite(with low prevalence and low mean intensity). One reason for this hypothesis is probably the presence of second obligatory intermediate hosts (roach and gobiids) in the seawater and the other reason is the simple availability of aquatic birds (definitive hosts) to large and extensive areas of sea than freshwater. It is possible that the infection of freshwater fish species (e.g. the fishes of Anzali wetland) is due to transmission of the nematode from the Sea to freshwater by migratory fish species.

In spite of the high diversity of fish species infected with *E. excisus* larvae, the abundance of the parasite is low both in freshwater and the Sea. It is probably due to the nematode larvae remaining in the organs of oligochaetes for a long time (at least 5 months) to become infective for fish. So, it is a limiting factor for abundance of the the larvae . Furthermore, most of the paratenic hosts (predatory fishes) may be large size. So, they can not be ingested by definitive hosts (cormorants).Therefore, the life cycle of the parasite may not be completed.

In histopathology, the severe destruction of tissues and infiltration of inflammatory cells were observed, which were mostly eosinophiles, macrophage and lymphocytes

gueldenstaedti (Mokhayer, 1972), *A. stellatus, A. persicus, Huso huso, A. nudiventris, Silurus glanis* and, *Esox lucius* (Sattari, 1996).

Paying attention to effects of the parasite on fish organs (castration, kidney and muscle destruction...) and subsequent economic loss, it has been attempted to identify the infected fish species and determine the prevalence and mean intensity of the parasite in them.

MATERIALS AND METHODS

Twelve fish species were collected during September 1999 – 2001. About 373 samples were examined. The study area was the south–west of Caspian Sea (Guilan province–Iran). After recording biometric characteristics (table.1), the samples necropsied based on common parasitology procedures: The viscera and muscles were examined for the parasite. The alive nematodes were fixed in hot 70% ethyl alcohol and cleared in glycerine alcohol or hot lactophenol. Some histopathological samples took from muscles , put in a fixative (10% buffered formalin) and after breaking in 5 micron sections , stained with hematoxilin and eosine to study the presence of the larvae in muscles and histopathological reactions of host tissues against the parasites. Standard statistical computations (mean, SD, range, prevalence) were calculated for the all samples by Microsoft Excel.

RESULTS

The prevalence (%), mean intensity and range of the *E. excisus* larvae have been presented in table2. As shown in this table, the prevalence of *E. excisus* larvae in Gobiids was more than other fish species *(Neogobius fluviatilis, 35.7%; N.kessleri, 50%* and *N.caspius, 14.3%)*. The prevalence of *E. excisus* larvae in *Perca fluviatilis* (33.3%) was also high. The prevalence of *E. excisus* larvae in other fish species was low.

Table1 The biometric characteristics of examined bonyfishes from south-west of Caspian Sea

Fish species	No. of fish	Mean & range of length (cm)	Mean & range of weight (g)
Cyprinus carpio	42	33.3(19-44.5)	545(120-1170)
Esox lucius	60	39.8(28.5-58)	429.8(140-1290)
Carassius auratus	42	29(20-39.5)	375(143-820)
Abramis brama	50	25(18-34)	194.6(71-450)
Perca fluviatilis	36	21.5(16.5-30.5)	164.2(40-450)
Vimba vimba persa	50	19.3(16.5-23.5)	79.4(30-149)
C. chalcoides	50	21.6(14-23.5)	100.6(21-253)
Neogobius fluviatilis	14	21.5(12.5-26.5)	122.3(22-203)
N. kessleri	12	23.8(22.4-26.5)	140.4(117-214)
N. caspius	7	13.7(12.2-15)	33(23-49)
Aspius aspius	5	-	-
Barbus capito	5	-	-

The parasite was observed as coiled in cysts inside the muscles of these two fish species. The parasite was also isolated from the body cavity of *Barbus capito, Aspius aspius* and muscles, ovaries, body cavity, upon liver and testis of *Neogobius fluviatilis, N.kessleri* and *N.caspius*.

DISCUSSION

As mentioned in introduction, *E. excisus* larvae have been reported from all sturgeons and some bonyfishes of Caspian Sea, but there was not any comprehensive study on parasites of bonyfishes of the Sea. The present survey which has been carried out in a two-year period, indicated that the *E. excisus* larvae is also found in other fish species such as perch (*p.fluviatilis*), asp (*Aspius aspius*) , barb (Barbus *capito*) , some

and fibroblasts surrounding the focal points of lesions.

In the present study , *P. fluviatilis* was found to be more infected with the *E. excisus* larvae which is a predatory fish and ingests the second intermediate hosts and also represents a considerable proportion of the food of the common cormorant (*P.carbo*)

In the present study, *E. excisus* larvae was not isolated from *Cyprinus carpio*, *Carassius auratus* gibelio, *Abramis brama orientalis*, *Vimba vimba persa* and *Chalcalburnus chalcoides*. It may be due to the fact that, they are not predatory fishes and they do not ingest the second intermediate hosts. So, they should not be expected to be infected with *E. excisus* larvae.

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