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Araştırma Makalesi

Scolex pleuronectis (Cestoda) Infections in Several Bony Fish Species Collected from Sinop Coasts of the Black Sea

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Abstract

In the present study, a tetraphylleadean larval cestode *Scolex pleuronectis* Müller, 1788 was determined in the intestine of shore rockling *Gaidropsarus mediterraneus,* Atlantic horse mackerel *Trachurus trachurus,* blotched picarel *Spicara flexuosa,* grass goby *Zosterissesor ophiocephalus* and round goby *Neogobius melanostomus.* Fish were collected by commercial fishermen in Sinop coasts of the Black Sea in April and May 2014. Infection prevalence and mean intensity values were determined as 12.5% and 2.00 ± 0.0 in shore rockling; 4.76% and 1.00 ± 0.0 in Atlantic horse mackerel; 20.0% and 6.80 ± 3.20 in botched picarel; 20.00% and 4.00 ± 0.0 in grass goby and, 1.44% and 55.00 ± 0.0 in round goby. Our results showed that this parasite species can be found widely at its larval stage in many bony fish species in the Black Sea.

Keywords: *Scolex pleuronectis*, Cestoda, Sinop, Black Sea

Karadeniz'in Sinop Kıyılarından Yakalanan Bazı Kemikli Balıklarda *Scolex pleuronectis* (Cestoda) Enfeksiyonları

Öz

Bu araştırmada, Nisan-Mayıs 2014 tarihlerinde Karadeniz'in Sinop kıyılarında balıkçı tekneleri ile avlanan Gelincik balığı (*Gaidropsarus mediterraneus*), İstavrit balığı (*Trachurus trachurus*), İzmarit balığı (*Spicara flexuosa*), sazkayası balığı (*Zosterissesor ophiocephalus*), Kum kaya balığı (*Neogobius melanostomus*) mide - bağırsak sistemleri bir tetraphylleadean larval sestod olan *Scolex pleuronectis* Müller, 1788 enfeksiyonları araştırıldı. Enfeksiyon oranı ve enfekte balık başına ortalama parazit sayıları Gelincik balığı % 12.5 ile 2.00 ± 0.0; İstavrit balığı % 4.76 ile 1.00 ± 0.0; İzmarit balığı % 20.0 ile 6.80 ± 3.20; sazkayası balığı % 20.00 ile 4.00 ± 0.0 ve kum kayası balığı % 1.44 ile 55.00 ± 0.0 olarak hesaplandı. Elde ettiğimiz bulgular bu parazitin Karadeniz'deki bir çok kemikli balık türlerinde yaygın olarak bulunabildiğini göstermiştir.

Anahtar Kelimeler: *Scolex pleuronectis*, Sestod, Sinop, Karadeniz

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Introduction

Tetraphyllideans have a three-host life cycle, comprising a procercoid stage in crustaceans, plerocercoid stage in teleosts and cephalopods, and adults in elasmobranchs [1]. First, discharged eggs from the vertebrate definitive hosts with feces contain ciliated larval stage are ingested by crustaceans, especially copepods; second, when the copepods are ingested by large teleost fishes, the plerocercoids develop; third, the cycle is completed when predaceous elasmobranchs feed on prey containing infective post-larvae [2]. The genus *Scolex* is used as a collective group named for plerocercoids of unknown generic affinity [3] and the collective name, *Scolex pleuronectis* Müller, 1788 was proposed for them by [4]. Tetraphyllidean larvae of *Scolex pleuronectis* is defined by the presence of typical 5 units in scolexes of small and white larvae. *Scolex pleuronectis* parasitize polychaetes, isopods, copepods and other crustacean, bivalve mollusks and various fish species in their developmental stages in different parts of the world [5,6,7]. Numerous studies reported larval *Scolex pleuronectis* to be cosmopolitan from gall bladder and/or intestine of more than 40 fish species from different parts of the world, Pacific Ocean [8,9], Atlantic Ocean [10,11,12], Indian Ocean [13], Adriatic Sea [14], Mediterranean Sea [15], Sea of Marmara [16], Aegean Sea (17,18,19,20], Red Sea [21,22], Baltic Sea [23]. This parasite has already been reported from about 40 fish species in the Black Sea [24,25,26,27,28,29,30]. Pseudophyllidean cestod plerocercoid have been reported to cause decrease in condition factor in fish, decrease carcass value if present in muscles, and in more advanced cases can lead to death [31,32].

The present study was conducted to determine endoparasitic cestodes in the common fish species inhabiting the coastal area of the Black Sea in Sinop, Turkey.

Material and Methods

Shore rockling *Gaidropsarus mediterraneus* (Linneaus, 1758) (n:8), Atlantic horse mackerel *Trachurus trachurus* (Linneaus, 1758) (n:21), blotched picarel *Spicara flexuosa* (Linneaus, 1758) (n:24), grass goby *Zosterissesor ophiocephalus* (Pallas, 1814) (n:5) and round goby *Neogobius melanostomus* (Pallas, 1814) (n:69) were collected by commercial fishermen using troll in Sinop coasts of the Black Sea during April and May 2014 and examined for cestode parasites in accordance with the standard methods indicated by [33]. Digestive tracts of fish were investigated for the occurrence of flatworms with the aid of a stereo microscope at the magnifications ×12 and ×50. The obtained parasites were separated from tissues, placed in saline solution and fixed with AFA and then stained with Mayer's carmalum for detailed investigation. Identification was conducted according to definition indicated by [34] and [21]. Infection prevalence, mean intensity and abundance were calculated in accordance with [35].

Results

Tetraphylladean *Scolex peuronectis* was the only cestode parasite found at its plerocercoid stage in the intestine of investigated fish species *G. mediterraneus*, *T. trachurus*, *S. flexuosa*, *Z. ophiocephalus* and *N. melanostomus*. The scolex of the parasite possesses four uniloculate bothridia and apical sucker, a non-segmented trunk and a body filled with calcareous corpuscles (Figure 1A-C). Body is 0.64 – 0.67 mm in length and 0.28 – 0.32 mm in width (n=15). The apical sucker has a diameter of 0.06 mm and lateral suckers' diameter is 0.05 mm.

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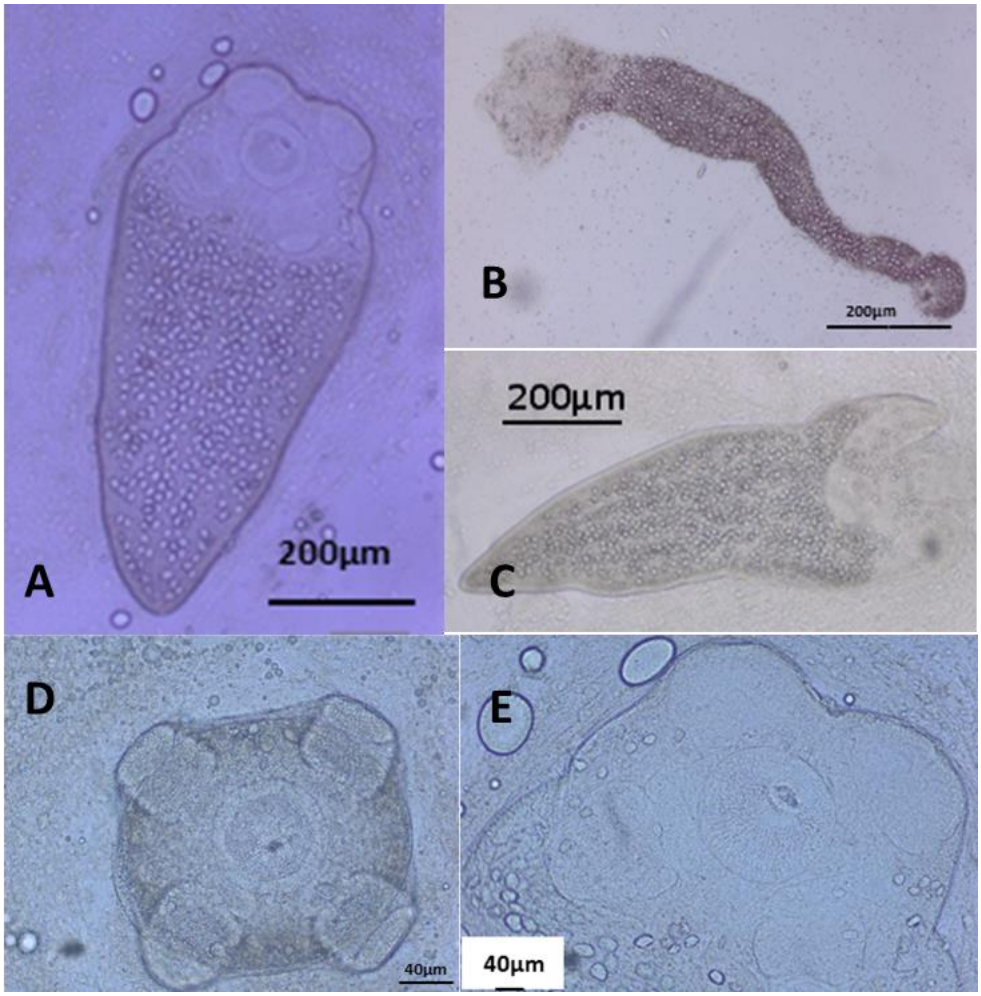

Figure 1. *Fresh larval Scolex pleuronectis individuals* ***A)*** *from intestine of S. flexuosa,* ***B)*** *from T. trachurus,* ***C)*** *from N. melanostomus,* ***D)*** *Apical view of suckers of parasite from Z. ophiocephalus* ***E)*** *Closer look to suckers of S. pleuronectis from T. trachurus*

Infection prevalence (%) and mean intensity values were calculated from all examined fish species and the respective data were presented in Table 1. The present study also revealed that out of hundred and twenty-seven examined fishes of the species *G. mediterraneus, T. trachurus, S. flexuosa, Z. ophiocephalus* and *N. melanostomus*, only 9 were infected by larval *S. pleuronectis* with a prevalence of 7.08%. Infection indices were at the lowest in shore rockling *Gaidropsarus mediterraneus* and the highest in blotched picarel *Spicara flexuosa*. Adult form of this parasite was not determined in any of the investigated fish species.

Table 1. *Host fish species, locality, site of infection, prevalence of infection and intensity values of Scolex pleuronectis reported in the literature and the present study*

Host	Area	Site of Infection	Prevalence (%)	Intensity	Reference
Macrourus berglax	Atlantic Ocean	Phylorus	2.9	2.0	[11]
Coryphaenoides mediterraneus	Atlantic Ocean	Phylorus	86.8	17.3	[11]
Halosauropsis macrochir	Atlantic Ocean	Phylorus	16.7	1.4	[11]
Myctophum punctatum	Atlantic Ocean	Phylorus	23.6	1.0	[11]
Notoscopelus kroyeri	Atlantic Ocean	Phylorus	20.3	1.0	[11]
Maurolicus muelleri	Atlantic Ocean	Phylorus	24.0	1.7	[11]
Maurolicus muelleri	Atlantic Ocean	Phylorus	20.0	1.4	[11]
Solea solea	Dardanelles		10.0	1.5 ± 0.7	[16]
Epinephelus fuscoguttatus	Red Sea	Pyloric caeca, stomach, intestine	19.64	-	[21]
Epinephelus chlorostigma	Red Sea	Pyloric caeca, intestine	5.0	-	[21]
Epinephelus summana	Red Sea	Pyloric caeca, intestine	9.38	-	[21]
Epinephelus tauvina	Red Sea	Pyloric caeca, stomach, intestine	3.45	-	[21]
Pomadasys argenteus	Red Sea	Intestine	5.5	2.8	[22]
Lepidopus caudatus	North Atlantic Ocean	Pyloric caeca, intestine	83.3	77.3 (1-644)	[10]
Trachurus capensis	South Africa	Gall bladder, Intestine	2.1 - 2.6	1.0	[37]
Scomber scombrus	Mediterranean Sea - Portugal	Intestine	2.5	-	[39]
Merluccius gayi	Pacific Ocean - Chile	intestine	1.1 - 85.0	1.3 – 6.0	[9]

Continued…

Flatfish	Chile	intestine	5.7	0.29	[40]
Synodus lucioceps	North Pacific Ocean	Intestine	-	-	[8]
Conger conger	Mediterranean Sea	Intestine	34.6 (17.6-55.2)	16.5 ± 4.9	[15]
Pleuronectes flesus	Ekinli Lagoon	Intestine	4.0	3 - 20	[38]
Gobius niger	Sea of Marmara	Intestine	12.6	1-12	[17]
Gobius cobitis	Sea of Marmara	Intestine			[17]
Merluccius merluccius	Sea of Marmara	Intestine			[17]
Eutrigla gurnardus	Sea of Marmara	Intestine	12.6	1-12	[17]
Solea vulgaris	Sea of Marmara	Intestine			[17]
Scorpaena scrofa	Sea of Marmara	Intestine			[17]
Conger conger	Aegean Sea	Intestine	7.69	14.5	[19]
Gempylus serpens	Java coast - Endonesia	Intestine	2.9	1	[13]
Thyrsitoides marleyi	Java coast - Endonesia	Intestine	100	2 (1-3)	[13]
Trichiurus lepturus	Java coast - Endonesia	Intestine, pyloric caeca, stomach	34.3	2 (1-4)	[13]
Brama dussumieri	Java coast - Endonesia	Intestine, stocmach	15.7	1.3 (1-2)	[13]
Tylosurus crocodilus	Java coast - Endonesia	Intestine	40	8.5 (1-16)	[13]
Zosterisessor ophiocephalus	Black Sea - Ukraine	-	10.0	1	[28]
Solea solea	Sea of Marmara -Turkey	Intestine	10.0	1-2	[16]
Trachurus mediterraneus	Black Sea - Ukraine		9.0	2-3	[27]
Belone belone	Black Sea - Ukraine		2.3	4	[27]
Ophidion rochei	Black Sea - Turkey	Intestine	33.0	1	[29]
Merlangius merlangus	Black Sea	Intestine	3.2-25.0	1.0 – 17.5	[30]
Gaidropsarus mediterraneus	Black sea	Intestine	12.5	2.0 ± 0.0	This study
Trachurus trachurus	Black sea	Intestine	4.76	1.0 ± 0.0	This study
Spicara flexuosa	Black sea	Intestine	20.0	6.8 ± 3.2	This study
Zosterisessor ophiocephalus	Black sea	Intestine	20	4.0 ± 0.0	This study
Neogobius melanostomus	Black sea	Intestine	1.44	55.0 ± 0.0	This study

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Discussion

Cosmopolitan and wide host occurring tetraphyllidean larvae of the *S. pleuronectis* type parasite not surprisingly occurred in the intestine of 5 different hosts belonging to 4 different fish families in the present study. The absence of adult stages of *S. pleuronectis* in the fishes under study indicates that they play a role as an intermediate host. Their life cycle, probably comprising marine crustacea (copepoda) as the first intermediate hosts and Elasmobranchii as final hosts, is still unresolved because of taxonomical difficulties within the Cestoda group [10]. Morphological characteristics of larval staged *S. pleuronectis* in the present study comply with previous reports [34, 21] and further identification of these larvae was not possible without knowledge of the strobila characteristics and life cycles as was indicated by [10].

Current information on *S. pleuronectis* regarding its host ranges and infection values from different hosts in the Turkish coasts of the Black Sea is very limited and there is only a couple of previous studies in this area [29; 30]. In the present study, The occurrence of *S. pleuronectis* in *G. mediterraneus, T. trachurus, S. flexuosa, Z. ophiocephalus* and *N. melanostomus* was studied for the first time in the Turkish coasts of the Black Sea and our study also expanded its global host range by the addition of *Spicara flexuosa*. Studies on its occurrence in different fish hosts yielded wide range of infection values from 1 up to 644 individuals per fish [10], and [36] reported previously the presence of this parasite in high numbers to be not surprising, since it was common in large predatory oceanic fishes. Our results on the infection prevalence and intensity values fall within the previous reports from different fish species from different marine environments as can be seen in Table 1.

Conclusion

Scolex pleuronectis infections in teleost fish species investigated in the present study show that they are among the potential host for cartilaginous fishes infected by adults of this parasite species. As the current study expanded its host ranges by the addition of a new teleost fish host, more studies are required to reveal actual hosts of this parasite species in the Black Sea.

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