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EUSTRONGYLIDOSIS OF EUROPEAN CATFISH (*SILURIS GLANIS*)

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Abstract

NOVAKOV, N., O. BJELIC-CABRILO, M. CIRKOVIC, D. JUBOJEVIC, J. LUJIC, I. DAVIDOV and M. JOVANOVIC, 2013. Eustrongylidosis of European Catfish (*Siluris glanis*). *Bulg. J. Agric. Sci*., Supplement 1: 72–76

Eustrongylidosis is caused by the nematodes from the genus Eustrongylides, which are parasites of piscivorous birds. Their life cycle require two intermediate hosts, aquatic oligochaetes and benthophagous fish. Human is not a typical host but may be infected if eats raw or insufficiently cooked or fried fish meat. The investigations were conducted in spring 2012 on Danube–Tisa–Danube Canal in the territory of Novi Sad where were collected 52 samples of European catfish (*Siluris glanis*) weighting 250–450 g. Presence of nematodes in the abdominal cavity, musculature, in the lumen of the stomach and encapsulated in stomach wall was revealed in 6 individuals after examination. The number of parasites per fish ranged from a few up to the 256. Parasites were determined as Eustrongylides sp. – larval form. Samples for pathohistology were taken from the muscles and nodules in stomach wall.

Key words: eustrongylidosis, European catfish, zoonosis, pathohistology

Introduction

Species of the genus *Eustrongylides* have complex life cycles involving a definitive host and two intermediate hosts. Definitive hosts include aquatic birds mostly from order Ciconiiformes family Ardeidae, Anseriformes, Gaviiformes and Pelecaniformes (Spalding and Forrester, 1993; Measures, 1988). First intermediate hosts for *Eustrongylides sp*. are aquatic oligochaetes (Spalding et al., 1993). Second intermediate hosts are planktivorous and benthivorous fishes that could pass the infection on to fishes (paratenic hosts) and finally on to fish eating birds (Moravec, 1994). Such exposure is usually common in larger fish species, like channel catfish – *Ictalurus punctatus* or pikeperch – *Sander lucioperca*, which, as predators, become infected with *Eustrongylides sp.* nematodes. In fish, these parasites are conspicuous as long, red, coiled individuals located in the body cavity or embedded in the muscle (Mitchum, 1995; Overstreet, 2003). They can produce grossly visible swelling or abdominal distention but mortalities from such infections are rarely reported and when they occur, they usually involve secondary infections or suboptimal environmental conditions (Bursey, 1982; Overstreet, 2003).

In humans who have consumed raw or undercooked fish, *Eustrongylides sp.* has produced gastritis and intestinal perforation (Deardorff and Overstreet, 1991; Cole, 1999). Guerin et al. (1982) were the first to report a natural (accidental) human infection with *Eustrongylides sp.*

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The aim of this paper is to distinguish the presence of these types of nematodes in European catfish in inland waters of Serbia, describe its pathological changes and to indicate the need for adequate preparation of fish meat as a precaution in human nutrition. In addition, it is very important to increase public awareness concerning the consumption of such fishes.

Material and Methods

During spring 2012, fifty-two fish samples of European catfish (*Siluris glanis*) weighing 250–450 g were collected from eight locations on Danube-Tisa-Danube Canal in the territory of Novi Sad. Postmortem examination of abdominal cavity, digestive tract and other ventral organs was conducted. Each fish was cut carefully from around the pectoral zone to the cloak using scissors to observe the body cavity and to extract the viscera. Collected nematodes were fixed in 70% ethanol. After fixation, each nematode was cleared in lactic acid for morphological observation and species identification. Relative parametars were measured and identification was performed using Bauer (1987), Moravec (1994) and Anderson (2000) keys.

Samples for patohistological examination were taken from muscles and nodules in stomach walls. Samples were fixed in 10% water-buffered formalin and imbedded into paraffin blocks. 5µm thick slices were cut and stained with standard haematoxylin & eosin staining.

Results

Examination revealed the presence of nematodes in the abdominal cavity (Figure 1), musculature, lumen of the stomach and encapsulated in the stomach wall (Figure 2) of 6 individuals, which presents prevalence of 11.54%. The number of parasites per fish ranged from a few up to the 256.

Parasites were determined as *Eustrongylides sp.* – larval form. Length of body was 50.8–60.5 mm, maximum width 0.49–0.58 mm. Buccal cavity 0.09–0.11 mm, oesophagus 0.907–1.35 mm. The larva retained a cuticle, and its twelve visible circle cephalic papillae were well defined. The number of papillae appeared to

Fig. 1. Eusrongylides sp. in the body cavity of European catfish (*Siluris glanis*)

Fig. 2. Eusrongylides sp. in the lumen of the stomach and encapsulated in the stomach wall of European catfish (*Siluris glanis*)

be six in each of two circles. The number of papillae was confirmed by apical observation with light microscopy. Inner circle papillae were spine-like apices and those of the outer circle were nipple-like apices.

Patohistological observation of muscles and nodules of stomach wall is presented in Figures 3 and 4. Specimens were surrounded by the encapsulations composed of granulomatosus inflammation including scattered lymphocytes.

Fig. 3. Cross-section of European catfish (*Siluris glanis*) muscles with Eustrongylides sp. larva (H&E)

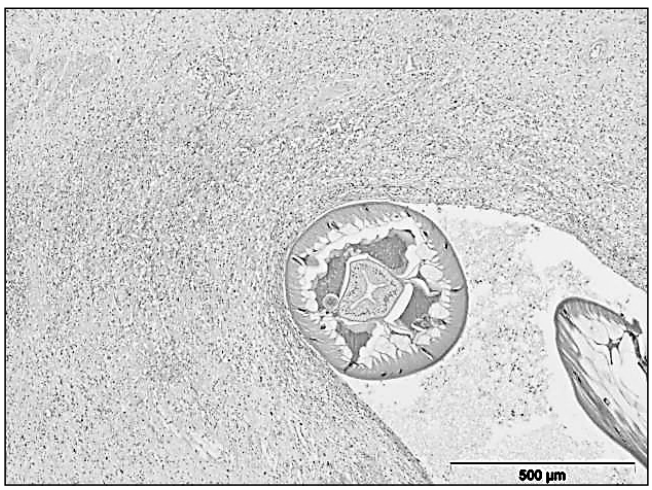

Fig. 4. Cross-section of European catfish (*Siluris glanis*) nodules in stomach wall with encapsulated Eustrongylides sp. larva (H&E)

Discussion

Eustrongylides sp. finding in European catfish is important from several aspects. Adult individuals inhabit the mucosa of the gastrointestinal tract of fish eating birds and can caused large mortality of nestlings younger than 4 weeks (Cole, 2009). Benthofagous fishes serve as second intermediate host of *Eustrongylides* sp., which can be found in muscle, free in body cavity and encapsulated in liver and other organs. Larvae are quite large and they often infect fishes with high intensity, so the hosts abdomen is bloated (Yanong, 2009). Consuming infected fish, predators can be infected and serve as paratenic host when they are fed upon by birds (Cole, 2009). Acording to Moravec et al. (1995) larve of the genus *Eustrongylides* belong to the group of the most pathogenic parasites.

Eustrongylides sp. have been reported in various freshwater fish in Japan (Abe, 2011), Iran (Rahanandeh et al., 2011), Papua New Guinea (Owen, 2005), Canada (Measures, 1987), Bangladesh (Chandra, 2006) etc. Our data presents a contribution to research of species from genus *Eustrongylides*in the Danube Basin, where individuals from this genus were previously observed in round goby (Francova et al. 2011) and European perch (Shukerova et al., 2010).

Catfish is a paratenic host in the development cycle for the nematode of the given genus. It is infected by consuming fish species that feed on benthos, which are the second intermediate hosts. The data on contamination of *Huso huso* mentioned by Satari and Mokhayer (2005) support this claim. These authors linked the presence of *E. excisus* larvae in this predator with its diet, which has *Rutilus rutilus caspius* and species of *Neogobius* genus as its main components. According to Czarnecki et al. (2003), the significant proportion of catfish diet is comprised out of *Rutilus rutilus*, but also out of European perch *Perca fluviatilis*, which is, according to Moravec (1994), the main source of *E.excisus* larvae infection for cormorant, while Shukerova et al. (2010) recorded presence of two nematode species from *Eustrongylides* genus in European perch in Lake Srebarna. The above mentioned data show routes of infection with *Eustrongylides* sp. larvae for catfish.

Fish parasites such as *Eustrongylides sp.* are highly important because they are capable to infect carnivorous organisms and humans who feed on them (Mohammad et al., 2011). Murrell (2002) suggested several control measures for preventing parasitic infections originating from freshwater, such as environmental control of surface water, hygienic aquaculture, and the control or elimination of the first intermediate hosts. FDA (2001) indicated that the effective methods for killing parasites are freezing, heating, adequate combination of salt content and storage time or hot smoking. On the other

hand, brining and cold smoking may reduce the parasite hazard in fish, but they do not eliminate or minimize it to an acceptable level (Murrell, 2002). While health education is a key factor in combating zoonotic infections, experience in various countries has shown that for successful implementation of control measures, it is necessary, as Hughes (1992) points out, to have formal and informal cooperation between medical and veterinary interests at all levels of government, and with the community. According to Okumura et al. (1999) and Chieffi et al. (1992), the recommendation to avoid consumption of raw or poorly cooked fish is still the best preventive procedure.

Conclusions

Eustrongylidiosis of European catfish (*Siluris glanis*) from Danube-Tisa-Danube Canal in Serbia was confirmed and described for the firs time in our country.

Eustrongiloides sp. has zoonotic importance, since larval forms of these nematodes are potentially harmful to mammalian hosts.

Fresh fish meat and traditional fish product should be subjected to a visual examination for the purpose of detecting visible nematodes and other parasites before being placed in the trade.

The consumption forms and the preparation of the fish food should be modified in a way that hazards to human health due to zoonotic parasites could be avoided.

Health education is a key factor in combating zoonotic infections.

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