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Anisakidae nematodes in the blackfin goosefish, *Lophius gastrophysus* Miranda-Ribeiro, 1915 purchased in the State of Rio de Janeiro, Brazil

Marcelo Knoff[1*], Sergio Carmona de São Clemente[2], Michelle Cristie Gonçalves da Fonseca[1], Nilza Nunes Felizardo[1], Francisco Carlos de Lima[2], Roberto Magalhães Pinto[1] and Delir Corrêa Gomes[1]

*[1]Laboratório de Helmintos Parasitos de Vertebrados, Instituto Oswaldo Cruz, Av. Brasil, 4365, 21045-900, Rio de Janeiro, Rio de Janeiro, Brazil. [2]Faculdade de Veterinária, Universidade Federal Fluminense, Niterói, Rio de Janeiro, Brazil. *Author for correspondence. E-mail: knoffm@ioc.fiocruz.br*

ABSTRACT. The blackfin goosefish is included in a prized fish category, representing valuable fishery resource worldwide. The aim of this study was to identify the Anisakidae larvae parasitizing this fish species, considering the hygienic-sanitary and public health importance of these parasites infecting specimens of the blackfin goosefish, *Lophius gastrophysus* Miranda-Ribeiro, 1915 (Lophiidae), purchased from markets in the municipalities of Cabo Frio, Niterói, Duque de Caxias and Rio de Janeiro; parasitological indices and sites of infection are presented. From March 2000 to December 2005, 87 specimens of *Lophius gastrophysus* were investigated for helminths. Seventeen fish (19.5%) were parasitized with larvae of anisakid nematodes. *Anisakis simplex*, *Hysterothylacium* sp. and *Raphidascaris* sp. appeared with prevalence of 1.14, 12.6 and 12.6%, intensity and mean intensity of infection of 1, 2.81, 10.5 and mean abundance of 0.01, 0.35 and 1.33 respectively. The sites of infection were stomach, stomach and intestine serosas and abdominal cavity. This is the first record of *Anisakis simplex*, *Hysterothylacium* sp. and *Raphidascaris* sp. for this species of fish.

Keywords: *Anisakis simplex*, *Hysterothylacium*, *Raphidascaris*, larvae, *Lophius gastrophysus*.

Nematoides Anisakidae no peixe sapo-pescador, *Lophius gastrophysus* Miranda-Ribeiro, 1915 comercializado no Estado do Rio de Janeiro, Brasil

RESUMO. Nematoides Anisakidae no peixe sapo-pescador, *Lophius gastrophysus* Miranda-Ribeiro, 1915 comercializados no Estado do Rio de Janeiro, Brasil. O peixe sapo-pescador é muito apreciado e representa um valioso recurso pesqueiro em nível mundial. O objetivo deste estudo foi o de identificar larvas de Anisakidae pela sua importância higiênico-sanitária e na saúde pública, cujos parasitos infectam espécimes do peixe sapo-pescador, *Lophius gastrophysus* Miranda-Ribeiro, 1915 (Lophiidae), obtidos em mercados dos municípios de Cabo Frio, Niterói, Duque de Caxias e Rio de Janeiro; são apresentados os índices parasitológicos e sítios de infecção dos helmintos encontrados. Foram investigados 87 espécimes de *Lophius gastrophysus* no período de março de 2000 a dezembro de 2005. Desses, 17 (19,5%) estavam parasitados por larvas de anisaquídeos. *Anisakis simplex*, *Hysterothylacium* sp. e *Raphidascaris* sp. apareceram com prevalências de 1,14, 12,6 e 12,6%, intensidade e intensidade média de infecção de 1, 2,81 e 10,5, abundância média de 0,01, 0,35 e 1,33 respectivamente. Os sítios de infecção foram o estômago, serosas do estômago e intestino e cavidade abdominal. Este é o primeiro registro de *Anisakis simplex*, *Hysterothylacium* sp. e *Raphidascaris* sp. nesta espécie de peixe.

Palavras-chave: *Anisakis simplex*, *Hysterothylacium*, *Raphidascaris*, larvas, *Lophius gastrophysus*.

Introduction

The species *Lophius gastrophysus* Miranda-Ribeiro, 1915 (Lophiidae), is widely known as "fishing fish" due to the way they attract preys to its wide mouth by moving the illicium. The lophiids are considered poor swimmers found in depths not exceeding 200 m, occasionally reaching 1,000 m, and mostly inhabit bottom environments. Eggs and larvae are pelagic, whereas juveniles are demersal, occupying deeper areas when adults (VALENTIM et al., 2007). The blackfin goosefish is included in a prized fish category, representing a valuable fishery resource worldwide. *Lophius gastrophysus* occurs from the State of Rio de Janeiro to Argentina, is the only species of Lophiiformes found in the Brazilian southeastern region (FIGUEIREDO; MENEZES, 1978) and is considered of high commercial value, mainly for international market. Considering the increasing opportunities to export meat of this fish species to the European and Asian countries, there was a rapid development related to organized fishery procedures involving Brazilian or other hired ships

in a wide and unprecedented occupation of fishing areas in the region between the north of Rio de Janeiro and south of Rio Grande do Sul (PEREZ et al., 2002; RAMELLA et al., 2005).

Exhaustively described over the years the food-borne parasitic infections are still of great concern in public health, with emphasis in the role played by the anisakid nematodes in the spreading of human anisakiasis due to infections with *Anisakis*, *Pseudoterranova* and *Contracaecum*, with the species *A. simplex* (Rudolphi, 1809) and *P. decipiens* (Krabbe, 1878) reported in most cases (ADAMS et al., 1997).

In humans, this parasitosis can occur after the ingestion of raw, poor cooked/smoked or superficially salted fish meat containing infective larvae (ACHA; SZYFRES, 2003; AUDICANA et al., 2002; HUANG; BUSSIÉRAS, 1988). Larvae can remain in the stomach cavity, without invading the tissues, causing a generally asymptomatic infection. In the invasive cases, larvae migrate to the gastric or intestinal mucosa inducing the appearance of edema, ulcers and bleeding (ACHA; SZYFRES, 2003); cases of angioedema, nauseas, vomiting, diarrhea, acute cutaneous rash, anaphylaxis, allergy, abdominal tumors, polyarthritis, angina-like thoracic pain, epigastric pain, bronchial spasm, empty stomach sensation, gastric ulcer simulation, ileitis and appendicitis (ALONSO et al., 1997; AUDICANA et al., 2002; DASCHNER et al., 1997; GARCÍA; ARAUZO, 2004; GÓMEZ et al., 2003; MERCADO et al., 1997, 2001; PURELLO-D'AMBRÓSIO et al., 2000; RODRÍGUEZ et al., 2006; RUBIO et al., 2003).

In fish, anisakiasis can affect several organs and the number of larvae can reach up to 100 specimens/fish (ACHA; SZYFRES, 2003). Usually, the most affected organ is the liver and the most important change is the atrophy (ACHA; SZYFRES, 2003). Anisakids can remain encapsulated in other organs, perforating the stomach wall, may cause visceral adherence and muscular destruction (ACHA; SZYFRES, 2003; EIRAS; REGO, 1987; FELIZARDO et al., 2009a; MOTTA et al., 2008; REGO et al., 1985; TEKIN-ÖZAN; KIR, 2007). Teleosteans, which play a role in the life cycle of anisakid worms as intermediate hosts, have been investigated aiming at finding the larval forms of these nematodes. This paper deals with the report of anisakids parasitizing specimens of *L. gastrophysus*, together with parasitological indices of prevalence, intensity, mean intensity, range of infection, mean abundance and sites of infection.

Material and methods

From March 2000 to December 2005, 87 specimens (female) of the blackfin goosefish *L. gastrophysus* were obtained from markets in the municipalities of Cabo Frio (39 specimens), Niterói (34 specimens), Duque de Caxias (six specimens), and Rio de Janeiro (eight specimens). Fish had 27-68 cm (40.95 cm) length. After being purchased, they were carried in isothermal containers with ice to the Laboratory of Helminth Parasites of Vertebrates, Oswaldo Cruz Institute, Oswaldo Cruz Foundation, Rio de Janeiro, to be investigated for helminths. The identification of fish is in accordance with Figueiredo and Menezes (1978). For the recovery procedures, specimens were eviscerated; the organs and abdominal musculature were transferred to individual Petri dishes with a 0.65% NaCl solution to be further examined under a stereoscope microscope. The filets, obtained after an incision from near the opercula to the insertion of the caudal fin, were observed using a negatoscope. Nematodes were processed for study in accordance with Amato et al. (1991). Identification of larval Anisakidae was based on Rego et al. (1983), Petter and Maillard (1988), Timi et al. (2001) and Felizardo et al. (2009b). The parasitic indices are in accordance with Bush et al. (1997). Representative specimens were deposited in the Helminthological Collection of the Oswaldo Cruz Institute (CHIOC), Rio de Janeiro, Rio de Janeiro State, Brazil.

Results

The Anisakidae collected from the specimens of *L. gastrophysus* were represented by larval stages, most of them with high prevalence. Only *A. simplex* occurred with prevalence lower than 10%. Seventeen specimens (19.5%) were parasitized with 3rd stage larvae of *A. simplex*, *Hysterothylacium* sp. and *Raphidascaris* sp. *Anisakis simplex* occurred only in the stomach serosa with prevalence of 1.14%, 1 of intensity and 0.01 of mean abundance (CHIOC no. 35687). *Hysterothylacium* sp. presented prevalence of 12.6% in different sites, with a mean infection of 2.81, range of infection of 1-10 specimens/fish and mean abundance of 0.35. Larvae were found in the stomach, intestinal serosa and abdominal cavity (CHIOC no. 35686). *Raphidascaris* sp. had prevalence of 12.6%, 10.5 of mean intensity, range of infection of 1-89 specimens/fish and mean abundance of 1.33. These larvae were present in the stomach (CHIOC no. 35685). Sixty-five per cent of the 17 parasitized fishes were infected with a single anisakid species, whereas 35% had hosted two species. Single infections occurred in 11 specimens, five parasitized with *Hysterothylacium* sp. and six with *Raphidascaris* sp. Co-infections with two species were

observed in six fish, one with *Anisakis simplex* and *Hysterothylacium* sp. and five with *Hysterothylacium* sp. and *Raphidascaris* sp.

This is the first report of *A. simplex*, *Hysterothylacium* sp. and *Raphidascaris* sp. in *L. gastrophysus*.

Discussion

The specific identification is restricted to a small group of larvae on the basis of morphological and morphometrics data, in accordance with previous findings related to anisakid larvae, recovered from other marine fish that occur in the littoral of the State of Rio de Janeiro, reported by Felizardo et al. (2009a and b).

The presence of larval stages of nematodes indicates the potential of this fish species as an intermediate host in life cycles of parasites trophically transmitted in the marine environment. Valentim et al. (2008) noting about 40 food items in the stomach of *L. gastrophysus*, among them, fish, mollusks and crustaceans, had suggested that the diet of *L. gastrophysus* promotes its role as intermediate hosts; thus the present results corroborate this statement, since only larval stages of the helminths were recovered. In Brazil, to date, there are no reports relative to human anisakiasis in despite of the recovery of larvae from marine and freshwater fish, and marine cetacean (ABDALLAH et al., 2005; BRASIL-SATO; SANTOS, 2005; KNOFF et al., 2004, 2007; LACERDA et al., 2009; LUQUE; POULIN, 2004; MOTTA et al., 2008; PRADO; CAPUANO, 2006; PEREIRA et al., 2000; TAVARES; LUQUE, 2006; SALGADO et al., 2004; SILVA; SÃO CLEMENTE, 2001; SILVA et al., 2000), together with the finding of alive Anisakidae larvae in the musculature of teleosteans (KNOFF et al., 2007; PADOVANI et al., 2005; SAAD; LUQUE, 2009).

The ingestion of raw fish meat (sashimi, sushi and "ceviche"), or smoked fish is becoming more frequent than ever in great Brazilian urban centers; the meat derives from marine and freshwater fish, including autochthonous or imported species that could promote the appearing of human anisakiasis in Brazil, taking into account the increasing popularity of restaurants and fast food facilities, specialized in serving exotic dishes as reported by Germano and Germano (1998). According to McCarthy and Moore (2000) the change of alimentary habits is an important cause for the establishment of helminth zoonotic infections, thus increasing the risk factors. Amato and Barros (1984) have reinforced this argument suggesting that anisakiasis may become an emergent zoonosis in Brazil. In addition, Pereira et al. (2000) have asserted that a major risk factor for infections is related to the frequent travels people choose, for business or fun, to countries in which exotic alimentary habits are maintained, along with the importation of natural, smoked or salted marine products. The World Health Organization - WHO informs that human infections can be prevented by avoiding the ingestion of raw fish meat, remarking that most of the anisakid species harmful to humans die under high temperatures; nevertheless, even the ingestion of well cooked fish meat containing dead larvae can promote the appearance of allergenic processes (ACHA; SZYFRES, 2003; ALONSO et al., 1997; AUDICANA et al., 2002; KASUYA et al., 1990).

Conclusion

The report on the presence of anisakid larvae emphasizes the importance of the Sanitary Inspection Service in adopting specific procedures to detect the presence of larvae and promote their control, considering their zoonotic threat; the prevention of anisakiasis mostly depends on the population sanitary education together with the knowledge of proper rules to be followed in order to avoid the spreading of this zoonosis (KNOFF et al., 2007; TAVARES; LUQUE, 2006).

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