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Research of nematoids of zoonotic importance in traíras (*Hoplias malabaricus* bloch, 1794) and tilapia (*Oreochromis niloticus*) in the State of São Paulo/SP, Brazil.

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ABSTRACT

OBJECTIVE

This work aimed to research the presence of parasites of zoonotic importance in fish of the species *Hoplias malabaricus* and *Oreochromis niloticus* collected in the State of São Paulo and which would be sent for human consumption.

METHODS

The 50 traíras (*Hoplias malabaricus*) were acquired from commercial fishmongers in the extreme south of the city of São Paulo, SP. However, the 50 tilapia (*Oreochromis niloticus*) were obtained in the municipality of Jarinu, SP. The specimens were necropsied for parasitological analysis. For the necropsy, an external and internal examination of the specimens was carried out. The parasites found were cleaned, fixed, separated by species and site of infection/infestation and quantified.

RESULTS

Of the 50 traíras (*Hoplias malabaricus* bloch, 1794) collected, 49 individuals were found in the mesentery *Contracaecum* spp., which represents a 98% positivity rate. A total of 3,568 specimens of *Contracaecum* spp. were found. In parasitized fish, presenting an average intensity of 71.42 parasites per parasitized fish. Of the 50 tilapia (*Oreochromis niloticus*) collected, none (0%) were positive.

CONCLUSION

Based on the information and data presented, we conclude that further studies of other fish species are necessary in order to determine the predominance of *Contracaecum* spp. in different species of fish and whether there is the existence of other parasites with zoonotic potential that could impact public health in the surroundings of these communities, allowing awareness campaigns and promotion of public policies.

DESCRIPTORS

Fish, *Contracaecum*, *Hoplias malabaricus*, *Oreochromis niloticus*, Zoonosis.

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INTRODUCTION

In Latin America, the first parasitological studies involving fish were carried out in the 19th century, however, in recent years work has contributed to the description of new species of helminths from South America. Luque & Poulin (2007)¹ report, the existence of 4,764 species of helminths described in fish from Latin America, of which 2,966 species were described in Brazilian fish.

Parasitic zoonoses transmitted by fish have increasingly drawn the attention of researchers and health authorities around the world, as they determine health problems in the population, which is infected by the consumption of raw or undercooked fish². According to the World Health Organization (WHO) (2009), more than 18 million people are infected with zoonoses transmitted by fish and more than half a million are at risk².

Some species of nematodes are potentially pathogenic for humans, especially those found in the muscles of fish. Man is an accidental host for fish parasitic nematodes, and in these hosts the helminths do not reach maturity³.

Anisakiasis occurs through the migration of L3 larvae of *Anisakis* spp., *Phocanema* spp., *Terranova* spp., *Contracaecum* spp. and *Pseudanisakis* spp. inside the intestinal wall of people susceptible to these parasites. Larvae are usually found in the viscera of some fish, serving as intermediate hosts for adult parasites, which are found in mammals, birds and marine fish⁴. Human infection occurs in countries where there is a habit of consuming raw, lightly salted or smoked fish⁵. There are also reports that anisakids can cause allergic reactions even when ingested in well-cooked fish⁶. Anisakiasis occurs when humans accidentally ingest anisakid larvae, penetrating the digestive tract, and causing an eosinophilic granuloma, which can occur in the gastric and intestinal walls, with the stomach being the most common location. Clinical symptoms include gastric or intestinal pain. Leukocytosis and eosinophilia usually occur. There is no abnormal tension of the abdominal muscles and there is no fever. According to scientific literature, these signs are important in distinguishing the disease from acute appendicitis and internal obstruction⁷.

In Brazil, there are reports on the occurrence of anisakids in fish of commercial importance, such as mackerel (*Scomber japonicus*), anchovies (*Pomatomus saltatrix*), snapper (*Pagrus pagrus*), kingfish (*Balistes vetula*), swordfish (*Trichiurus lepturus*), hake (*Merluccius gayi*) and salmon (*Thyrsites atun*)⁴.

Currently, researchers have reported cases of allergic reactions caused by eating well-cooked fish, but infected with anisakids. The existence of this allergenic potential led researchers to consider this agent in the differential diagnosis of urticaria in humans with reports of fish ingestion⁶.

This work aims to research the presence of parasites of zoonotic importance in fish of the species *Hoplias malabaricus* and *Oreochromis niloticus* collected in the State of São Paulo and which would be sent for human consumption.

METHODS

The 50 tilapia (*Hoplias malabaricus*) from the Guarapiranga Reservoir in the extreme south of the city of São Paulo, SP, were acquired from commercial fishermen, from November 2020 to May 2021. However, the 50 tilapia (*Oreochromis niloticus*) were obtained from commercial captivity located in the municipality of Jarinu, SP, in the same period. The fish used were identified according to Britski et al. (1999)⁸.

The fish were placed in a Styrofoam box with ice, and then taken to the Veterinary Medicine laboratory (LabVet) at Universidade Santo Amaro, São Paulo, SP.

The specimens were necropsied for parasitological analysis. For the necropsy, an external and internal examination of the

specimens was carried out. The fins, skin, eyes, lips and interior of the oropharyngeal cavity were observed. The nasal cavities were washed with 0.65% saline solution and the liquid was observed under a stereomicroscope. The gills were removed and observed under a stereomicroscope. After removing the gills, the visceral cavity of the fish was opened through a medial-ventral incision, from the anus region to the isthmus, to expose the internal organs. The coelomic cavity and viscera were observed macroscopically and, subsequently, removed and examined individually under a stereomicroscope and, subsequently, the muscles were filleted for examination using a light table, according to Barros et al., 2010².

The parasites found were cleaned, fixed, separated by species and site of infection/infestation and quantified.

Helminths recovered from fish were kept in a Petri dish with 0.65% physiological saline and subsequently processed according to the methodology described by Amato et al. (1991)⁹. Taxonomic identification was carried out according to Vicente et al. (1999)¹⁰.

The occurrence was obtained through the ratio between the number of fish infected with a given species of parasite and the number of fish examined, expressed as a percentage. The average intensity was represented by the ratio between the number of parasites of a given species and the number of fish infected with this species¹¹.

RESULTS

Of the 50 traíras (*Hoplias malabaricus* bloch, 1794) collected, 49 individuals were found in the mesentery *Contracaecum* spp., which represents a 98% positivity rate. This species of fish is considered a predator of other types of fish, which may have facilitated parasitism by these animals. A total of 3,568 specimens of *Contracaecum* spp. were found in parasitized fish, presenting an average intensity of 71.42 parasites per parasitized fish.

Of the 50 tilapia (*Oreochromis niloticus*) collected, none (0%) were positive.

DISCUSSION

The present work reports, for the first time, the presence of *Contracaecum* spp. in fish sold for human consumption in the extreme south of the city of São Paulo, SP, Brazil, representing a risk for consumers.

Among the traíras (*Hoplias malabaricus*) that were examined, 98% of them were parasitized with *Contracaecum* spp. Azevedo et al. (2010)¹² reported the presence of larvae of *Contracaecum* spp. parasitizing *Astronotus ocellatus* in the State of Rio de Janeiro, with a parasitism rate of 2.8%. Furthermore, Neves et al. (2013)¹³ and Tavares-Dias & Neves (2017)¹⁴ recorded the presence of this parasite in fish from the States of Amapá and Amazonas. In a study carried out by Benigno et al. (2012)¹⁵, *Hoplias malabaricus* collected on Marajó Island was analyzed, revealing a positivity rate of 34.31%.

Of the 26 Brazilian federative units and the Federal District, records of *Contracaecum* spp. larvae were documented in 15 states. Although most occurrences are related to studies of freshwater fish, it is important to note that the State of Rio de Janeiro occupies the first position in the number of records in the literature of Anisakidae larvae, especially in marine fish¹⁶.

It is worth noting that *H. malabaricus* are piscivorous when they are adults, but during their juvenile phase, their diet includes plankton, microcrustaceans, insects and seeds¹⁷. Microcrustaceans act as the first intermediate hosts, while fish play the role of second intermediate hosts or paratenic hosts for the larvae of *Contracaecum* spp., while piscivorous birds are the definitive hosts¹⁸.

Martins et al. (2005)¹⁹, reported parasitism of *Contracaecum* spp. in 100% of the *H. malabaricus* analyzed, values close to those found in the present study. However, other reports in Brazil also report high infectivity of specimens of *Contracaecum* spp. in this species of fish²⁰.

The fact that larvae of *Contracaecum* spp. of the present study were found in the mesentery of traíras, reflecting the accentuated tropism for parasitism in this location. This behavioral characteristic of the parasite was also described by Barros et al. (2010)² in specimens of *Pygocentrus nattereri* in 99% of the fish analyzed. These parasites were not found in the muscles of *P. nattereri*^{2,21}, and in *H. malabaricus*²². However, occurrences of *Contracaecum* spp. larvae. in the musculature of traíras were observed in the State of Maranhão, Brazil¹⁹.

Ingestion of fish parasitized by anisakids can trigger allergic reactions of different intensities in humans, especially in patients with hypersensitivity, justifying the importance of carrying out prior inspection of these fish when intended for human consumption²³.

CONCLUSION

The presence of parasitism of *Contracaecum* spp. is concluded. in *Hoplias malabaricus* and the absence of parasites of zoonotic importance in *Oreochromis niloticus* analyzed.

Based on the information and data presented, further studies of other fish species are necessary in order to determine the predominance of *Contracaecum* spp. in different species of fish and whether there is the existence of other parasites with zoonotic potential that could impact public health in the surroundings of these communities, allowing awareness campaigns and promotion of public policies.

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