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Endoparasites of Food-fish landing from the Calabar River, Cross River State, Nigeria

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Authors' Contributions

Author APE designed the study, managed the laboratory analysis and identification of samples, collated all components of the work, edit and sent it to the journal for publication. He is the author for correspondence. Author VOE managed the literature search, assisted in the collection and analysis of samples in the laboratory. Author JPU managed the analysis of data generated from the study, assisted in the field collection of samples and the correction of the manuscript. Author JAO managed the field collection of samples, assisted in the identification of species of parasite. All authors read and approved the final manuscript submitted for publication.

Original Research Article

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ABSTRACT

Aims: To investigate the abundance and prevalence of endoparasites of landed food-fishes from the Calabar River, Cross River State and the public health implications to fish consumers.
Place and Duration of Study: Weekly fish samples were collected for a period of six months (2012) at Nsidung beach, Nigeria.
Methodology: A total of 300 fish specimen were collected from 15 fish species (20 from each species) from local fishermen and transported to the Fish Pathology laboratory, University of Calabar, for identification and examination. Organ squash of some organs (liver, spleen, heart and kidney). Stomach and intestinal scrapes were examined microscopically for parasites.
Results: Examination showed an overall prevalence of 60% for *Bathygobius soporato,*

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15% for *Chrysichthys nigrodigitatus,* 10% for *Clarias gariepinus* and 25% for *Synodontis clarias*. The preferred organs for Parasite infection were the stomach and intestines of affected fish. Nematodes, trematodes and cestodes were found in decreasing order of abundance. *Camallanus kirandensis* (nematoda) was found in the intestines and stomach of *B. soporato, S. clarias, C. nigrodigitatus and C. gariepinus*. *Clinostomum complanatum* (trematoda) in the stomach and intestine of *B. soporato*; *Diphyllobothrium latum* (Cestoda) in the stomach of *C. nigrodigitatus*; *Pomporhynchus laevis* (*acanthocephala*) in the intestine of *B. soporato, S. clarias* and *C. nigrodigitatus* and in the stomach of *S. clarias*.
Conclusion: It was concluded that *B. soporato, C. nigrodigitatus, C. gariepinus* and *S. clarias* from the Calabar River, landed at Nsidung beach are susceptible to helminth infection and it is recommended that all fish be properly cooked or roasted before consumption to guard against possible human infection by some parasites.

Keywords: Endoparasites; fish; calabar river; public health; prevalence; abundance.

1. INTRODUCTION

Parasites are common in most ecological systems, and all free living organisms can be potential hosts to parasites [1]. Parasites play an important role in the ecology of aquatic ecosystems. They can cause harm to the host by tissue damage and can also make the host more susceptible to secondary infection, by weakening host immunity and subsequent economic losses resulting from fish mortality [2,3]. The possibility of parasites harboring bacteria or viruses and being able to transmit them to the host organism has been reported [4]. There is a public health concern on some parasitic diseases which may be transmitted from fish to man through fish consumption [5], thereby posing health hazards to raw fish consumers [6].

Endoparasitic diseases affect the normal health conditions and cause reduction of growth, abnormal metabolic activities and even death of affected fish. According to Kabata [7], factors that directly influence the abundance and prevalence of endoparasitic fauna of fishes include; age, diet, environment of fishes and season. Several studies have been carried out on fish parasites from different river systems in Nigeria [5,8-21].

The objective of this study was to investigate the prevalence and abundance of endoparasites of landed fishes from the Calabar River, Nigeria and to recommend appropriate measures to safeguard the possible health implications to fish consumers.

2. MATERIALS AND METHODS

2.1 Description of Study Area

This study was carried out in Nsidung beach, Calabar south, Cross River state. The station is located in the tropical rain forest belt of Nigeria and lies along latitude 4º45´ N and longitude of 8º30´ E. The environmental condition of the river system is poor as a result of waste inputs from the surrounding communities, industries and land erosion [22].

2.2 Collection of Samples

A total of 300 fish specimen were collected from 15 fish species (20 specimens from each species) from local fishermen at the beach site as soon as they landed every week for a period of six months (May – October, 2012). Fish samples were transported in a cool bucket containing ice flex to the fish pathology laboratory, University of Calabar, for identification and examination.

2.3 Examination of Samples and Identification of Parasites

Organ squash of some organs (liver, spleen, heart, and kidney) were made and examined as wet mounts microscopically. The intestines were opened with a pair of scissors, scrapped onto a grease-free glass slide and examined microscopically for parasites. The stomach was opened and the contents collected into glass petri dishes for examination with a stereo microscope for parasites. Parasites were identified according to [23-26].

2.4 Determination of Prevalence and Numerical Abundance of Endoparasites

Prevalence of Parasite was calculated using the following formula:

Prevalence = Total no. of infected fish (x100) / Total no. of fish hosts examined.

Abundance was calculated according to Ekanem et al. [21] as follows:

Abundance = (Total No. of parasites recovered/Total no. of fish host examined).

3. RESULTS

3.1 Numerical Abundance of Parasites of Fish Examined

A total of 81 specimens of endoparasites occurred in four of the 15 landed fish species examined: 50 in *B. soporato*, 12 in *C. nigrodigitatus*, 3 in *C. gariepinus* and 16 in *S. clarias* Table 2. No parasites were found in the other species. *B. soporato* was infested with *Camallanus kirandensis* (Nematoda) in the stomach and intestine, *Clinostomum* sp. (Digenea) in the stomach and *Pomporhynchus laevis* (Acanthocephala) in the intestine. *C. nigrodigitatus* was infested with 5 camallanid nematodes in the stomach and intestine, *Diphyllobothrium* sp. (Cestoda) and *Pomporhynchus laevis* in the intestine. *C. gariepinus* was infested with camallanid nematodes in the intestine while *S. clarias* was infested with *Camallanus* (Nematoda) and *Pomporhynchus* (Acanthocephala) in the stomach and intestine Table 2.

3.2 Prevalence of Endoparasites in Relation to Fish Size

In receding order, overall parasite prevalence in the four infected species was *B. soporator* > *S. clarias* > *C. nigrodigitatus* > *C. gariepinus* Table 1. Endoparasites of landed fish were most prevalent in *B. soporator* in the 10-19.9cm length, followed by the 20 -29.9cm length class of the same species, the 10 -19.9cm length class of *S. clarias*, the 20-29cm length class of *C. nigrodigitatus*, the 20 -29.9cm length class of *S. clarias*, the 30-39cm length class of *C. nigrodigitatus* and finally the lowest prevalence which was recorded in the 20-29cm and 10-19 cm length classes of *C. gariepinus* Tables 3a.- 3d.

Table 1. Fish species examined and number infested and overall parasite prevalence in fishes landed from the Calabar river

Fish species	Family	Number examined	Number infested	Overall parasite prevalence per fish species (%)
Bathygobius soporator	Gobiidae	20	12	60
Chrysichthys nigrodigitatus	Claroteidae	20	3	15
Clarias gariepinus	Clariidae	20	2	10
Synodontis clarias	Mochokidae	20	5	25
Total		80	22	100

Table 2. Numerical abundance of endoparasites of landed fish from Nsidung beach

	Nematoda		Trematoda		Cestoda		Acanthocephala		
Fish species	**INT**	**STM**	**INT**	**STM**	**INT**	**STM**	**INT**	**STM**	**Total**
A.nurse	0	0	0	0	0	0	0	0	0
B. soporator	25	12	6	2	0	0	5	0	50
C. nigrodigitatus	3	2	0	0	1	0	6	0	12
C. citherus	0	0	0	0	0	0	0	0	0
C. gariepinus	3	0	0	0	0	0	0	0	3
E. fimbriata	0	0	0	0	0	0	0	0	0
H. odoe	0	0	0	0	0	0	0	0	0
M. sebae	0	0	0	0	0	0	0	0	0
M. rume	0	0	0	0	0	0	0	0	0
O. niloticus	0	0	0	0	0	0	0	0	0
P. quadrafilis	0	0	0	0	0	0	0	0	0
P. elongates	0	0	0	0	0	0	0	0	0
S. barracuda	0	0	0	0	0	0	0	0	0
S. mystus	0	0	0	0	0	0	0	0	0
S. clarias	4	8	0	0	0	0	3	1	16
Total	35	22	6	2	1	0	14	1	81

**(INT= Intestine; STM=Stomach)*

Table 3. Prevalence of parasites in relation to fish size (cm) in 3a. *Bathygobius soporator, 3*b. *Chrysichthys nigrodigitatus, 3*c. *Clarias gariepinus* and 3d. *Synodontis clarias*

3a. *Bathygobius soporator*

Standard length (cm)	No of fish examined	No. and % of fish infested	Total No. of parasite recovered
10 – 19.9	15	10(33)	37
20 – 29.9	5	2(40)	13
Total	20	12	50

3b. *Chrysichthys nigrodigitatus*

Standard length (cm)	No. of fish examined	No. and % of fish infested	Total No. of parasite recovered
20 – 29.9	10	2(20)	9
30 – 39.9	4	1(25)	3
Total	14	3	12

3c. *Clarias gariepinus*

Standard length (cm)	No of fish examined	No. and % of fish infested	Total No. of parasite recovered
10 – 19.9	8	1(12.5)	2
20 – 29.9	8	1(12.5)	1
Total	16	2(100.00)	3

3d. *Synodontis clarias*

Standard length (cm)	No of fish examined	No. and % of fish infested	Total No. and % of parasite recovered
10 – 19.9	15	4(26.7)	12
20 – 29.9	5	1(20)	4
Total	20	5(100.00)	16

4. DISCUSSION

The overall prevalence of 7.33% of parasites observed in the present study is similar to the low prevalence reported by Ekanem et al. [21] in the Great Kwa River but lower than the observation of 13.6% prevalence in Imo River [27] 60.23% prevalence of Olofintoye [28] in some freshwater fish species in Ekiti State; 43.3% prevalence by Bichi and Ibrahim [7] in Tiga Lake (Northern Nigeria) and 59.15% prevalence of infection by Onyedineke et al. [3] from the River Niger (Ilushi). This indicates that the distribution of parasites varied from one habitat to the other which could be attributed to host-parasite relationship and some abiotic factors like dissolved oxygen, temperature and pH. [29]. Endoparasites recovered include nematode (*C. kirandensis*), cestode (*D. latum*), trematode (*C. complanatum*) and acanthocephala (*P. laevis*) which was similar to Ekanem et al. [21] who also reported that the low infestation rate in these fishes could be attributed to the sanitary condition of the study areas, the location of the river from living place, number and classes of people visiting the river and their purposes.

The number of nematodes (57) isolated was higher than acanthocephalan (15), trematode (8) and cestodes (1). This observation is similar to Ekanem et al. [21] and Onyedineke et al. [3] who reported higher number of nematodes than other parasites. According to Ekanem et al. [21], nematodes are known to occur in body cavities and subcutaneous tissues. Host specificity of nematodes agrees with the findings of Akinsanya et al. [19] and Onyedineke et al. [3]. In the present study, acanthocephalans were found in the intestine of fish examined which agrees with the findings of Awachie [30], Onyedineke et al. [3]. Olurin and Somorin [18] in fishes from Kainji Lake and Owa stream respectively. This finding also support the work of Rosas-Valdez and Perez-Ponce de Leon [31] who reported that parasites show some level of preference for the host they parasitize. According to Kabata [7], *Clinostomum*

(trematode) when ingested with under-cooked fish is capable of producing laryngopharyngitis which is an unpleasant inflammatory condition in man.

Out of 81 parasites isolated, 56 were isolated from the intestine and 25 from the stomach. This observation could be associated with the fact that most digestive activities take place in the intestine resulting in the release of parasite ova and cysts in food particles Onyedineke et al. [3]. Comparing the prevalence of parasites in relation to length classes for all the species, 30-10-19.9 cm (standard length) recorded the highest number of parasites which disagrees with Ekanem et al. [21] who reported highest prevalence for all the species in length class 30-39.9cm (standard length). This might be attributed to large amount of food intake by the animals. However, prevalence of parasites in individual species in relation to length classes showed that parasites were most prevalent in *Bathygobius soporator* in length Class 10-19.9 cm (standard length) with 37 parasites and least prevalent in *C. gariepinus* in length class 20 -29cm with only 1 parasite. Also, this finding disagrees with Ekanem et al. [20] who reported highest prevalence of parasitic infestation *in C. nigrodigitatus* of length class 20-29.9cm when the species were compared individually.

5. CONCLUSION AND RECOMMENDATION

Endoparasites were recovered in four out of fifteen fish species including *B. soporato, S. clarias, C. nigrodigitatus* and *C. gariepinus*. Endoparasites recovered include nematodes (*C. kirandensis*), cestodes (*D. latum*), trematodes (*C. complanatum*) and acanthocephalan (*P. laevis*). It could be concluded that fishes of the Calabar River are infested with stomach and intestinal parasites that could pose public health concern to fish consumers who consumes raw or improperly cooked or smoked fish.

Fishes from the Calabar River should be properly cooked or smoked before consumption to avoid health risk due to some parasites.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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