Research Article

Gastrointestinal Helminth Parasites Community of Fish Species in a Niger Delta Tidal Creek, Nigeria

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A pool of fish species in a Niger Delta tidal creek, Buguma Creek, Nigeria, collected monthly from November 2004 to June 2006, at flood tides, were examined for gastrointestinal helminth parasites. The fish species were caught with hooks and lines and cast nets. Only nematode parasites were encountered in the study. Of the 1,149 fish specimens examined, 213 (representing 18.5%) were infected with various nematodes parasites. *Dasyatis margarita* had the highest prevalence rate of 66.7% (2 infected out of 3 examined), followed by *Pseudotolithus* (*Pseudotolithus*) *senegalensis* with a prevalence of 41.7% (10 infected out of 24), while the least infected were *Arius gigas* and *Pomadasys jubelini* with prevalence of 3.8% and 1.4%, respectively. No infection was recorded in *Elops lacerta*, *Gobius* sp., *Lutjanus agennes*, *L. goreensis*, *Argyrosomus regius*, *Sphyræna guachancho*, *S. sphyræna*, *Cynoglossus senegalensis*, *Sarotherodon melanotheron*, *Tilapia guineensis*, *Liza falcipinnis*, *Mugil cephalus*, and *M. curema*. The nematode parasites, *Capillaria zederi*, and *Aplectana hamatospicula* had the highest prevalence of 33.3% in *D. margarita*. *Laurotravassoxyuris* sp. also had the same prevalence in *Trichiurus lepturus*. *Goezia sigalasi* had the second highest prevalence of 12.5% in *P. (Fonticulus) elongatus* which had the highest number examined, due to its high dominance in the water.

1. Introduction

Roundworms called nematodes are the most common parasites found in marine fishes [1]. Potentially all freshwater and brackish water fish may be affected, with heavier infections in predatory fish, particularly in species also utilizing fish as intermediate or transient hosts [2]. Forty (40) species of adult nematodes, representatives of families from fish in Africa, have been reported [3]. The majority occur in the alimentary system and only few enter tissues or inner cavities (Philometridae and Anguillicola, the Swimbladder) [2]. Copepods are the first intermediate host to Camallanidae, Cucullanidae, Philometridae, and Anguillicolidae. Life cycle studies of *Procamallanus laevionchus* and *Paracamallanus cyathopharynx* in Egypt revealed a development of the first three larval stages in *Mesocyclops leuckarti* [2]. Camallanidae give birth to first stage larvae, which are ingested by the copepods. Larvae in copepods, or other invertebrate hosts, will develop to fourth stage larvae and further into adult

males and females when ingested by a suitable definitive host. Larvae ingested by “wrong” piscine hosts often survive as waiting stages (fourth stage larvae) in the gut or other tissues for a variable length of time and continue development into the adult stage if their carrier host (paratenic host) is predated by a compatible host [4]. Host specificity of nematodes is variable. *Procamallanus laevionchus* has been reported from fish hosts of six different families, *Paracamallanus cyathopharynx* only from species of *Clarias*, while *Rhabdochona congolensis* and *Spinitectus allaeri* have been reported from numerous diverse host species. The very host specific is species of *Capillaria*, most oxyurids, and the philometrids *Nilonema gymmnarchi* and *Thwaitia bagri* [3, 5]. Globally, there is paucity of the literature on the helminth parasites of marine and estuarine fishes, with the following records available [6–15]. The neglect of marine fish parasitology has been attributed to ignorance of the occurrence, distribution, and taxonomy of the parasites in fish [13].

There are reports of helminth parasite infections in freshwater fishes from a few localities in Nigeria, but a wide gap exists for the brackish water ecosystem. The only existing data on brackish water fisheries are those on Lagos lagoon [16] and Warri River [17]. Data on the gastrointestinal helminth parasites of sciaenid species [18] and the threadfin fish, *Polydactylus quadrifilis* [19], in the study creek, Buguma Creek, Niger Delta, Nigeria, have been published. This paper is the first to provide information on the different types of helminth parasites, their prevalence of infection, and mean abundance in the alimentary tracts of fish species community of a tidal creek in Nigeria.

2. Materials and Methods

The Buguma Creek is located southeast of the Niger Delta between longitude 6°47'E and 6°59'N and latitude 4°36'N and 4°59'N (Figure 1). Detailed description of the three fish sampling stations has been given [20].

The fish samples collected monthly from November 2004 to June 2006, at flood tides from three stations, were caught by the use of hooks and lines and cast nets. The fish samples were pooled, ice-packed, kept chilled under ice-blocks in a plastic cooler, and immediately transported to the laboratory. In the laboratory, fish specimens were sorted and identified to species level using the keys and descriptions of [21, 22].

The gut of each specimen was removed and preserved in specimen bottles containing 4% formaldehyde. Each gut was cut open and the contents washed into a petri dish using 4% formaldehyde. The contents were searched for nematodes under a low power (21–40x) binocular dissecting microscope. The sorted specimens were preserved in 4% formaldehyde. Diverse species of nematodes recognized were sorted into different types and counted. Each type was mounted in Toluidine blue in lactophenol on a slide covered with a clean cover slip and sealed with nail varnish.

Each specimen type was photographed with Format I microstar IV Reichert photomicroscopic, model 1762. Identification of specimens to the least possible taxon was done with the aid of photographs and further examination of the specimens under the NIKON compound microscope, using taxonomic identifications [23, 24].

3. Results

A summary of infection of the fishes with the various helminth parasites is given in Table 1. Only nematode parasites were encountered in the study. Of the 1,149 fish specimens examined, 213 (representing 18.5%) were infected with various stomach nematode parasites. Stingray, *Dasyatis margarita* (Family: Dasyatidae), had the highest prevalence of 66.7% (2 infected out of 3 examined), followed by *Pseudotolithus* (*Pseudotolithus*) *senegalensis* (Family: Sciaenidae) with a prevalence of 41.7% (10 infected out of 24), while the least infected were *Arius gigas* (Family: Ariidae) and *Pomadourys jubelini* (Family: Haemulidae) with prevalence of 3.8% (2 infected out of 53) and 1.4% (1 infected out of 72), respectively. The most dominant fish, *P. (Fonticulus)*

elongates, had a prevalence of 23.4% (176 infected out of 753 examined). No infection was recorded in *Elops lacerta*, *Gobius* sp., *Lutjanus agennes*, *L. goreensis*, *Argyrosomus regius*, *Sphyrna guachancho*, *S. sphyrna*, *Cynoglossus senegalensis*, *Sarotherodon melanotheron*, *Tilapia*, *guineensis*, *Liza falcipinnis*, *Mugil cephalus*, and *M. curema*.

A total of 64 nematode parasite species belonging to 27 families and 7 orders were recorded. *Capillaria zederi* and *Aplectana hamatospicula* had the highest prevalence of 33.3% in *Dasyatis margarita*. *Laurotravassosyuris* sp. also had the same prevalence in *Trichiurus lepturus*. *Goezia sigalasi* had the second highest prevalence of 12.5% in *P. (Fonticulus) elongatus* which had the highest number examined, due to its high dominance in the water. The parasites with the lowest prevalence of 0.1% occurred in *P. (Fonticulus) elongatus*, and they were *Amiroides* sp., *Anafilaroides* sp., *Allintoshius* sp., *Aplectana Mexicana*, *Phacochoerostrongylus* sp., *Orneoascaris* sp., *Plicatolabia* sp., *Neocucullanellus* sp., *Neocucullanus neocucullanus*, *Heliconema* sp., *Parascarophis* sp., and *Ascarophis* sp.

4. Discussion

Ingestion of larval helminth parasites by fishes is a frequent event due to the abundance and diversity of these tropically transmitted parasites in aquatic ecosystems [25–27]. Comparison of the results of this study with earlier studies is limited due to the paucity of the literature on brackish water/marine fish helminth parasites, particularly on helminth community studies of fish species of an entire ecosystem. Although only nematode helminth parasites were encountered, earlier studies have reported the presence of digenea and the dominance of nematodes. The nematode, *Hysterothylacium* sp. (Anisakidae), and the digenean, *Cryptocotyle lingua* (Herophidae), were the dominant parasites in four fish species of Wadden Sea [9]. Nematodes dominated the gastrointestinal helminth parasites of white croaker, *Micropogonias furnieri*, from the coastal zone of the state of Rio de Janeiro, Brazil [28].

The 18.5% prevalence reported in this study is comparable to the 19.7% rate of infection recorded in the brackish water zone of Warri River, Nigeria [17]. Infection rates seem to vary greatly from one locality to the other. Factors responsible for this variations could be differences in physical and chemical conditions of the water; for instance, the present study was conducted in an environment with salinity of 0%–21%, ranging from limnetic/oligohaline to polyhaline conditions. *Pseudoterranova decipiens*, for example, is not rare but rather a well-established parasite of the Antarctic fauna, which demonstrates the ability of this cosmopolitan species to complete its life cycle even under condition of subzero temperatures [10]. Current and water conditions have been considered as contributory factors [29]. Other factors are geomorphology [10, 30] as well as season. The component parasite communities of *Scomber japonicus* might be explained by the presence of different population stocks in different regions [13]. Diet of the host has been attributed to be the main factor determining the structure of the parasite

TABLE 1: Summary of helminth parasites infection of fish species in Buguma Creek, November 2004–June 2006.

S/no.	Fish species	No. examined	No. (%) infected	Parasites recovered	No. (%) of fish infected	Max no. per host	Mean no. per infected host
1	Family: Elopidae <i>Elops lacerta</i>	1	0	—	—	—	—
	Family: Ariidae						
2	<i>Arius gigas</i>	53	2 (3.8)	Family: Oxyuridae <i>Avilandros</i> sp.	2 (3.8)	3	2
	Family: Gobiidae						
3	<i>Gobius</i> sp.	1	0	—	—	—	—
	Family: Serranidae						
4	<i>Epinephelus aeneus</i>	6	1 (16.7)	Family: Quimperiidae <i>Paraquimperia</i> sp.	1 (16.7)	1	1
	Family: Carangidae						
5	<i>Caranx latus</i>	10	1 (10)	Family: Philometridae <i>Ichthyophilaria</i> sp.	1 (10)	1	1
	Family: Lutjanidae						
6	<i>Lutjanus goreensis</i>	20	0	—	—	—	—
7	<i>Lutjanus agennes</i>	4	0	—	—	—	—
	Family: Haemulidae						
8	<i>Plectorhinchus macrolepis</i>	5	1 (20)	Family: Trichuridae <i>Capillaria baicalensis</i>	1 (20)	1	1
9	<i>Pomadasyd jubelini</i>	72	1 (1.4)	Family: Cucullanidae <i>Cucullanus</i> sp.	1 (1.4)	1	1
	Family: Sciaenidae						
10	<i>Argyrosomus regius</i>	12	0	—	—	—	—
11	<i>Pseudotolithus (Pseudotolithus) senegalensis</i>	24	10 (41.7)	Family: Cyathostomidae <i>Chapiniella</i> sp.	1 (4.2)	1	1
				Family: Trichostrongylidae <i>Trichohelix</i> sp.	1 (4.2)	2	2
				Family: Heterakidae <i>Africana</i> sp.	1 (4.2)	2	2
				Family: Kathlanidae <i>Spectatus</i> sp.	1 (4.2)	1	1
				Family: Oxyuridae <i>Laurotravassoxyuris</i> sp.	1 (4.2)	1	1
				<i>Oxysomatium</i> sp.	1 (4.2)	2	2
				<i>Thaparia</i> sp.	1 (4.2)	8	8
				<i>Tachygonetria</i> sp.	1 (4.2)	1	1
				<i>Travnema travnema</i>	1 (4.2)	1	1
				Family: Subuluridae <i>Maupasina</i> sp.	1 (4.2)	1	1
				Family: Ascarididae <i>Goezia sigalasi</i>	3 (12.5)	4	2
				<i>Goezia spinulosa</i>	1 (4.2)	1	1
				Family: Heterocheilidae <i>Ichthyianisakis</i> sp.	2 (8.3)	3	2
				<i>Pseudaniasakis</i> sp.	3 (12.5)	19	8

TABLE 1: Continued.

S/no. Fish species	No. examined	No. (%) infected	Parasites recovered	No. (%) of fish infected	Max no. per host	Mean no. per infected host
12 <i>Pseudotolithus (Fonticulus) elongatus</i>	753	176 (23.4)	Family: Cucullanidae <i>Cucullanus</i> sp.	1 (4.2)	1	1
			Family: Gnathostomatidae <i>Echinocephalus</i> sp.	1 (4.2)	1	1
			Family: Hedruridae <i>Hedruris</i> sp.	1 (4.2)	1	1
			Family: Physalopteridae <i>Heliconema</i> sp.	1 (4.2)	1	1
			<i>Paraleptus</i> sp.	1 (4.2)	1	1
			Family: Dipetalonematidae <i>Lemdana</i> sp.	1 (4.2)	1	1
			Family: Trichuridae <i>Capillaria zederi</i>	7 (0.9)	2	1
			Family: Dioctophynidae <i>Eustrongylides</i> sp.	1 (0.1)	1	1
			Family: Ancylostomatidae <i>Arthrocephalus</i> sp.	1 (0.10)	1	1
			Family: Cyathostomatidae <i>Amiroides</i> sp.	1 (0.1)	1	1
			<i>Phacochoerostrongylus</i> sp.	1 (0.1)	1	1
			<i>Chapiniella</i> sp.	2 (0.3)	1	1
			Family: Pseudaliidae <i>Anafilaroides</i> sp.	1 (0.1)	1	1
			Family: Trichostrongyidae <i>Nematodirella</i> sp.	3 (0.4)	1	1
			<i>Allintoshius</i> sp.	1 (0.1)	1	1
			<i>Trichohelix</i> sp.	2 (0.3)	4	4
			Family: Atractidae <i>Pseudatractis</i> sp.	8 (1.1)	3	2
			Family: Heterakidae <i>Africana</i> sp.	4 (0.5)	1	1
			Family: Kathlanidae <i>Spectatus</i> sp.	2 (0.3)	1	1
			Family: Oxyuridae <i>Amblyonema</i> sp.	2 (0.3)	1	1
			<i>Aplectana mexicana</i>	1 (0.1)	1	1
			<i>Heteroxynema</i> sp.	3 (0.4)	1	1
			<i>Laurotravassoxyuris</i> sp.	9 (1.2)	3	2
			<i>Avilandros</i> sp.	11 (1.5)	6	2
			<i>Thaparia</i> sp.	8 (1.1)	9	3
			<i>Tachygonetria</i> sp.	3 (0.4)	3	2
			<i>Typhlonema</i> sp.	2 (0.3)	2	2
			<i>Travnema travnema</i>	5 (0.7)	2	1
			Family: Subuluridae <i>Maupasina</i> sp.	3 (0.4)	1	1
			Family: Ascarididae <i>Orneoascaris</i> sp.	1 (0.1)	2	2

TABLE 1: Continued.

S/no. Fish species	No. examined	No. (%) infected	Parasites recovered	No. (%) of fish infected	Max no. per host	Mean no. per infected host
			<i>Trispiculascaris</i> sp.	2 (0.3)	1	1
			<i>Goezia sigalasi</i>	52 (6.9)	14	1
			<i>Geozia spinulosa</i>	2 (0.3)	4	3
			<i>Neogoezia</i> sp.	5 (0.7)	3	2
			Family: Heterocheilidae			
			<i>Contracaecum</i> sp.	1 (0.1)	2	2
			<i>Heterotyphlum</i> sp.	3 (0.4)	1	1
			<i>Ichthyanisakis</i> sp.	2 (0.3)	1	1
			<i>Pseudanisakis</i> sp.	43 (5.7)	3	1
			<i>Raphidascaris</i> sp.	2 (0.3)	1	1
			<i>Terranova</i> sp.	5 (0.7)	1	1
			<i>Plicatolabia</i> sp.	1 (0.1)	1	1
			Family: Quimperidae	15 (2)	3	1
			<i>Paraquimperia</i> sp.			
			Family: Acuariidae	2 (0.3)	1	1
			<i>Skrjabinoclava</i> sp.			
			Family: Ancyracanthidae	2 (0.3)	2	2
			<i>Ancyracanthopsis</i> sp.			
			Family: Camallanidae	1 (0.1)	1	1
			<i>Procamallanus</i> sp.			
			Family: Cucullanidae			
			<i>Dichelyne</i> sp.	1 (0.1)	1	1
			<i>Neocucullanus neocucullanus</i>	1 (0.1)	1	1
			<i>Neocucullanellus</i> sp.	1 (0.1)	1	1
			Family: Gnathostomatidae	2 (0.3)	1	1
			<i>Echinocephalus</i> sp.			
			Family: Haplonematidae	2 (0.3)	2	2
			<i>Pingus</i> sp.			
			Family: Hedruridae	5 (0.7)	2	1
			<i>Hedruris</i> sp.			
			Family: Physalopteridae	1 (0.1)	1	1
			<i>Heliconema</i> sp.			
			<i>Paraleptus</i> sp.	2 (0.3)	1	1
			Family: Rhabdochonidae	5 (0.7)	1	1
			<i>Ichthyobronema</i> sp.			
			<i>Spinitectus</i> sp.	1 (0.1)	1	1
			Family: Spiruridae			
			<i>Parascarophis</i> sp.	1 (0.1)	1	1
			<i>Ascarophis</i> sp.	1 (0.1)	1	1
			Family: Dipetalonematidae			
			<i>Skrjabinofilaria</i> sp.	1 (0.1)	1	1
			<i>Lemdana</i> sp.	2 (0.3)	3	3
			Family: Anguillicolidae	1 (0.1)	1	1
			<i>Anguillicola</i> sp.			
			Family: Philometridae	1 (0.1)	1	1
			<i>Ichthyofilaria</i> sp.			

TABLE 1: Continued.

S/no.	Fish species	No. examined	No. (%) infected	Parasites recovered	No. (%) of fish infected	Max no. per host	Mean no. per infected host
Family: Monodactylidae							
13	<i>Psettias sebae</i>	38	4 (10.5)	Family: Trichostrongylidae <i>Nematodirella</i> sp.	1 (2.6)	1	1
				Family: Oxyuridae <i>Oxysomatium</i> sp.	1 (2.6)	1	1
				<i>Avilandros</i> sp.	1 (2.6)	1	1
				Family: Cucullanidae <i>Dichelyne</i> sp.	1 (2.6)	1	1
				Family: Gnathostomatidae <i>Echinocephalus</i> sp.	1 (2.6)	1	1
				Family: Physalopteridae <i>Proleptus</i> sp.	1 (2.6)	1	1
				Family: Rhabdochonidae <i>Filochona</i> sp.	1 (2.6)	1	1
Family: Sphyaenidae							
14	<i>Sphyaena afra</i>	5	2 (40)	Family: Camallanidae <i>Camallanus</i> sp.	1 (20)	2	2
				Family: Rhabdochonidae <i>Ichthyobronema</i> sp.	1 (20)	1	1
15	<i>Sphyaena guachancho</i>	1	0	—	—	—	—
16	<i>Sphyaena sphyaena</i>	1	0	—	—	—	—
Family: Polynemidae							
17	<i>Polydactylus quadrifilis</i>	76	12 (15.8)	Family: Ancylostomatidae <i>Arthrocephalus</i> sp.	1 (1.3)	1	1
				Family: Cyathostomatidae <i>Phacochoerostrongylus</i> sp.	1 (1.3)	2	2
				<i>Chapiniella</i> sp.	1 (1.3)	1	1
				Family: Heterakidae <i>Moaciria</i> sp.	1 (1.3)	3	3
				Family: Oxyuridae <i>Laurotravassoxyuris</i> sp.	1 (1.3)	1	1
				Family: Ascarididae <i>Goezia sigalasi</i>	5 (6.6)	2	1
				Family: Heterocheilidae <i>Pseudanisakis</i> sp.	1 (1.3)	1	1
Family: Trichiuridae							
18	<i>Trichiurus lepturus</i>	3	1 (33.3)	Family: Oxyuridae <i>Laurotravassoxyuris</i> sp.	1 (33.3)	6	6
Family: Cynoglossidae							
19	<i>Cynoglossus senegalensis</i>	1	0	—	—	—	—
Family: Cichlidae							
20	<i>Sarotherodon melanotheron</i>	8	0	—	—	—	—
21	<i>Tilapia guineensis</i>	18	0	—	—	—	—
Family: Mugilidae							
22	<i>Liza falcipinnis</i>	1	0	—	—	—	—
23	<i>Mugil cephalus</i>	2	0	—	—	—	—

TABLE 1: Continued.

S/no. Fish species	No. examined	No. (%) infected	Parasites recovered	No. (%) of fish infected	Max no. per host	Mean no. per infected host
24 <i>Mugil curema</i> Family: Dasyatidae	31	0	—	—	—	—
25 <i>Dasyatis margarita</i>	3	2 (66.7)	Family: Trichuridae <i>Capillaria zederi</i>	1 (33.3)	2	2
			Family: Oxyuridae <i>Aplectana hamatospicula</i>	1 (33.3)	1	1
			Family: Rhabdochonidae <i>Spinitectus</i> sp.	1 (33.3)	1	1
			Family: Spiruridae <i>Hartertia</i> sp.	1 (33.3)	13	13
Total	1149	213 (18.5)				

community in four fish species in the Wadden Sea [9]. *Contracaecum osculatum* was encountered only during the later half of the year in Sable Island harbor seals (*Phoca vitulina*) suggesting an association with prey species of corresponding periodicity in their distribution [11]. In the present study the parasites had the highest densities, with the highest dominance in *P. (Fonticulus) elongatus* in the dry season, corresponding with the influence of season, change in physicochemical conditions, particularly salinity, and improved availability of food prey. It is not known why there was no infection in *Elops lacerta*, *Gobius* sp., *L. gorensis* and *L. aeneus*, *A. regius*, *S. sphyraena*, *S. melanothron* and *T. guineensis*, *L. falcipinnis*, *M. cephalus*, and *M. curema*. As represented by most previous workers, *Camallanus* sp. and *Procamallanus* sp. dominate infection and appear more frequent in fishes than other parasites in Nigerian rivers [31, 32]. But in this study, *Goezia sigalasi* was the most dominant, infecting three species of fishes, *P. (Pseudotolithus) senegalensis* (12.5%), *P. (Fonticulus) elongatus* (6.9%), and *P. quadrifilis* (6.6%). In this study, *Camallanus* sp. was only encountered in *S. afra*, while *Procamallanus* was not encountered. *Pseudoterranova decipiens* was observed to be the commonest nematode occurring in Sable Island harbour seals (*Phoca vitulina*) [11], while *Anisakis* sp. was the dominant species in the Club mackerel *Scomber japonicus* from the harbour of Mehdiya Kenitra (Atlantic Coast of Morocco) [13]. Other nematode parasites encountered in this study that have been reported in southern Nigeria waters are *Spinitectus* sp. [32] and *Cucullanus* sp. [31]. *Contracaecum* sp., *Spinitectus* sp., and *Raphidascaris* sp. have been reported in the Atlantic Coast of Morocco [13]. *Pseudoterranova decipiens*, *Contracaecum osculatum*, and *Anisakis simplex* have been reported in Sable Island harbour seals (*Phoca vitulina*) [11], while a new nematode species, *Paracapillaria epinephelus*, has been described from the stomach of the marine fish *Epinephelus morio* (Serranidae) from the Coastal water of the Gulf of Mexico in Yucatan [33].

The availability and abundance of the definitive host (for the parasites that use fish as intermediate host) and the intermediate hosts (for the parasites that use fish as definitive

hosts) could be a factor responsible for the variations in the levels of infections in the host [31]. However, the life cycle of the parasites in the locality would have to be clearly studied. Even though nematode parasites are diverse in fish species of the tidal creek, tissue change due to infection was not observed. However, some data concerning some of the parasites species recorded in the study or congeners exist in the literature. In Ascaridoidea, some data exist concerning the pathogenicity of *Raphidascaris acus*, and some data on the pathogenicity of anisakis larvae also exist [13]. Beside their potential pathogenicity in club mackerel, larvae of *Anisakis* sp. are of public concern. In 12,586 cases of anisakiasis, painful inflammation of the human gastrointestinal track was recorded in Japan, between 1968 and 1989, mainly caused by anisakid nematodes, *Anisakis* spp. and *Pseudoterranova decipiens*. The dominance of *Anisakis* sp. larvae, responsible sometimes for several migrans in humans, reemphasizes the importance of thoroughly cooking the mackerel before consumption by the populace. Anisakids, such as *Contracaecum* spp., usually infect the alimentary track of their definitive hosts, which are generally marine mammals [34]. Marine crustaceans, cephalopod mollusks, or fishes often serve as intermediate or paratenic (transport) hosts. Anisakids are not found in the flesh of fishes; they infect the visceral organs instead. Thus, these parasites are not usually harmful to the fish they infect [35, 36]. In experimental infections of juvenile and adult chickens, mallard ducklings, mice hamsters, and rats, *Contracaecum multipapillatum* was not harmful. However, in marine birds, *Contracaecum multipapillatum* can infect the proventriculus portion of the stomach and cause lesions. This parasite can also cause granuloma in dogs that eat fish. *Contracaecum multipapillatum* is also capable of infecting domestic cats [35, 37].

5. Conclusion

The parasitic infection recorded in the present study is important to the fishery in the area and requires to be checked since brackish water serves as a good source of fish food

FIGURE 1: Map of the study area: (a) Nigeria showing Niger Delta, (b) Rivers State showing Buguma, (c) the study creek showing fish sampling stations.

for coastal communities in Nigeria, particularly in the Niger Delta. Further investigation of parasites in other organs of the fish species is recommended in order to close the wide gap existing for the brackish water ecosystem.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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