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Helminth Parasites of *Chrysichthys nigrodigitatus* (Lacepede: 1803) in the Mid-Cross River Flood System, South Eastern Nigeria

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Abstract

The parasitological studies of wild fish of *Chrysichthys nigrodigitatus* was conducted to determine the prevalence of endoparasite using physiological saline floatation method and microscopy respectively. The investigation revealed that various parasite of nematode and cestodes were implicated from the microscopical examination of the stomach contents of the fish examined. The males (152) recorded a lower rate of infection (33.2%), the females (248) has a prevalence of (66.9%). Helminth parasites recovered include nematodes; *Rhabdochona congolenisis*, *Procamallanus laeviunculus*, *Paracamallanus cyathopharynx* and *Capillaria sp*. and cestodes; *Diphyllobothurium latum* and *Pherocercoid* sp. Parasite burden was high and dependent of sex and age of fish.

1. Introduction

The silver catfish, *C. nigrodigitatus* occurs in most of the major rivers in Africa including Nigeria, Senegal etc (Ezenwa, 2003). They are highly valued food fish in this native Africa waters and are among the dominant fishers of commercial catches. Knowledge of the biology of *Chrysichthys* is important for its management and sustainable utilization of the stock, thus, biological assessment has been carried out by many authors including Ezenwa (2004) and Ekanem (2002) to determine the quality and populations of the species in different water bodies in Nigeria. *C. nigrodigitatus*, of the family Claroteidae plays a pivotal role in the ecology and fisheries of Nigeria in particular, and West African at large. It is a highly valuable fish species amongst the indigenous African populations. The emanating need to culture fishes for protein consumption for teeming rapidly growing population in the developing countries have made it necessary to intensify studies of the parasite fauna of the African freshwater fishes. Although listed as a generalized predator, *C. nigrodigitatus* is generally omnivorous being adopted for aquaculture, environmental degrading including oil spillage, pollution and destruction of mangrove swamps have had a considerable impact on the breeding and nursery coastal habitat of the fish, particularly in Nigeria (Anyanwu, 1991; Ekanem1996). The parasite checklist of Khalil and Polling (1997), documented a sparse parasite fauna for *C. nigrodigitatus,* recording the occurrence of *Protoancylodiscoids chrysichythys*. (Obiekeizie *et al*., 1988) in Nigeria reported the *Aspidojastrid trematodes* and *Aspidogastrea africanus* in *C. nigrodigitatus.* Therefore this study seeks to investigate the helminth parasite of wild *C. nigrodigitatus* sampled from the mid-Cross River flood system, South eastern Nigeria for the adequate management of the bagrid fishery.

2. Materials and Methods

2.1. Study Area

The study area is mid-Cross River flood system which lies between $5^0$57" latitude $5^0$30'20" North and$7^0$58" longitude $5^0$30'20" East (Okoh*et al*., 2007).The river system covers an area of 54000km^2, with 14000km^2 in Cameroun and 39000km^2 in Nigeria (Moses 1979; Lowenberg and Kunzel, 1992; King, 1996). The vegetation around the beach is characterized by shrub and *Raphia* palms, *Raphiasudamica*, and oil palms, (*Elaeisguineensi)s*. Floating grass occur on the periphery of the beach, there is relative amount of zooplanktons and phytoplankton.

The period of November to March is usually that of dry seasons. The water level is restricted to the main beach channel. The beach is known to support agricultural and fishery activities as well as other domestic purposes. There is a market near the beach where farmers bring their harvested fishes and other farm products. While some people engage in fish farming, others engage in excavation of sand from the river and transport of log of woods. Most of these activities happen in the dry season when water level has reduced drastically. They also cultivate such farm crops like cassava, maize, yam, melon, groundnut etc, during the wet season. There is also water fluctuation with season which goes a long way to determine the agricultural activities of the inhabitants during each period. During the dry season i.e. (November to March) some area of the river floor is seen and covered with sand, thereby fishing activities will be abandoned and most fisherman would change over to another agricultural activity. But during the raining season, (April to September), water level will increase and then reverses the activities of the people.

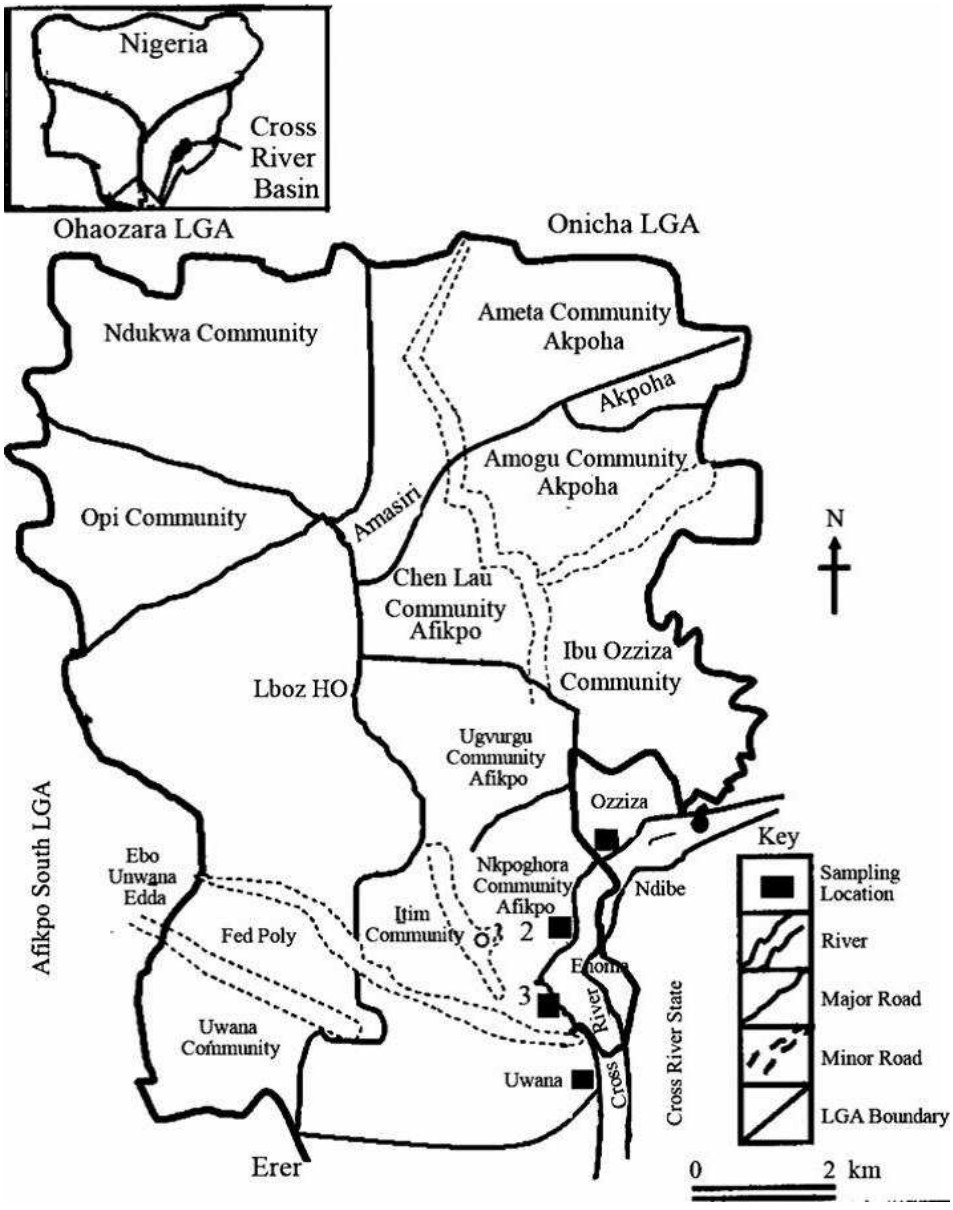

Fig. 1. *Map of Afikpo North Local Government Area showing the sampling location in the Cross River basin (Okoh et al., 2007).*

2.2. Procurement and Preservation of Fish Samples

Several fishes are caught by different fishing methods used by the Local fishermen who fish the river. The fishes are caught and sold to local market women who came from different communities located around the beach. The fishing methods used include; cast nets, hook and line, set line, long line, drag nets, lift nets, entangling nets, traps etc. Fish sample were bought from the indigenous artisanal fishermen over a period from July 2013 to September 2013. A total of 400 randomly selected fresh samples of *C. nigrodigitatus*were bought at Ndibe beach of the mid Cross river flood system.

2.3. Sampling, Measurement and Identification of Parasites

A total of four hundred (400) samples of *C. nigrodigitatus* species were brought to Applied Biology Department Laboratory, Ebonyi State University for sampling and identification. Identifications were done using the methods of Holden and Reed (1972) and Olaosebikan and Raji, (1998). Using meter rule, the total length of the fish (TL) was measured from the tip of the snout to the tip of the largest lobe of the caudal fin. Fish weights were determined by the use of a digital electronic weighing balance and recorded respectively. The fish were placed in the dissecting board. In dissecting the fish, a mid-ventral cut was made on each fish from the anal aperture to the base of the open column. The body walls were cut open at both sides, thereby given room for thorough exposure and examination of gastro-intestine tract (GIT). The gastro intestinal tract was isolated at various parts (esophagus, stomach, small and large intestine). The gastro-intestinal parts separated from the other visceral organs, placed in petri dishes and numbered according to the size of the fishes and preserve with 10% ethanol to prevent decay. The sex of the fish was also determined after dissection. The intestines were further carefully slit open and the content were placed in the glass petri dish and later collected into glass slide and smeared and using physiological saline floatation methods (Cheesbrough, 2000). The slide was viewed with microscope. The parasites were identified using guides provided by (Deborah *et al*., 2005).

3. Results

Four hundred fish specimens were subjected to parasitological investigations. A total of two hundred and thirty three (238) of the fish samples were infected and overall prevalence of intestinal helminthes infections was 59.5%. The prevalence of helminth parasite showed that a total number of 86 (21.5%) of the males samples were infected and 59(14.8%) samples of these were infected with nematode parasites while 27(6.7%) were infected with cestode parasites. Female samples had a total prevalence of 152(38.0%) with 103(25.7%) were of nematode parasites and 49(12.3%) were of cestode parasites (Table 1). Total number of samples infected with nematode parasites was 162(40.5%) and cestode parasites was 76(19.0%) (Table 1). Length class 30-40 cm had the highest (21.0%) infection rate while length class 10-20 cm had the lowest infection rate (Table 2). Lowest infection (3.3%) was in samples of *C. nigrodigitatus*with weight 1-100g and highest infection (15.7%) was in samples with weight 400-500g (Table 3). Nematode parasites encountered were *Rhabdochona congolensis*, *Procamallanus laexionchus, Paracamallanus cyathophargnx* and *Capillaria spp* while cestode parasites were *Diphyllobothrium latum* and Plerocercoide. The helminth parasites occurred in their different life cycle stages, eggs and larvae (Table 4).

Table 1. *The prevalence of endo-parasite isolated in relation to the sex of C. nigrodigitatus.*

Sex	Number Examined	Number(%) Infected		
		Nematodes	Cestodes	Total
Male	152	59 (14.8)	27 (6.7)	86 (21.5)
Female	248	103 (25.7)	49 (12.3)	152 (38.0)
Total	400	162 (40.5)	76 (19.0)	238 (59.5)

Table 2. *Infection rate in relation to the length (cm) of C. nigrodigitatus.*

Length (cm)	Number Examined	Number Infected	Percentage Infected (%)
10-20	47	22	5.5
20-30	58	27	6.7
30-40	130	84	21.0
40-50	102	68	17.0
50-60	63	37	9.3
Total	400	238	59.5

Table 3. *Infection rate in relation to the weight (g) of C. nigrodigitatus.*

Weight (g)	Number Examined	Number Infected	Percentage Infected (%)
1-100	30	13	3.3
100-200	35	20	5.0
200-300	41	28	7.0
300-400	77	50	12.5
400-500	117	63	15.7
500-600	55	34	8.5
600-700	45	30	7.5
Total	400	238	59.5

Table 4. *The prevalence of the parasites life cycle stages in C. nigrodigitatus.*

Parasite	No. of eggs	No. of larvae	No. of adults
Nematodes			
Rhabdochona congolensis		53	
Procamallanus laevionchus		203	
Paracamallamus cyathopharynx		201	
Capillaria spp	95	105	
Cestodes			
Plerocercoide spp		25	
Diphyllobothrium latum		12	
Total	95	599	

4. Discussions

The female fish samples had higher prevalence of infection then the male ones. This is in agreement with Akinsanya*et al.* (2007) who stated that female fishes are more prone to parasite infection then the males. Female fishes could be arrayed to be constant feeders then male and as such give opportunities of ingesting parasite organisms which in either way alter the physiology of the fish like reduce growth, reduced fecundities and weight loss. It also increases the public health problems associated with eating parasite infected fish. The study shows that higher prevalence (38.0%) were recorded in female while (21.5%) prevalence were recorded in male which means male fishes were less infected. Nematode infection in the female samples was highest while cestode infection was the lowest. Larger fish samples had higher infection rate than smaller fish samples. This may be attributable to high level of exposure to absorbable food materials for larger sizes fishes. Single and mixed infections were observed. This indicates that *C. nigrodigitatus* is a potential reservoir of helminth parasites. This is attributable to the fact helminth parasites depends on the presence of absorbable foods materials in the lumen of the gut. Chubb (1979) however suggested that an antibody complement system secreted into the intestine probably in the mucus prevents the establishment of parasites. The availability of cretin classes of nutrients and their different site of digestion and absorption will play a definite role in determining the parasite kind and their distribution in the intestine. This present study recovered *P. cyathopharynx* in *C. nigrodigitatus*. This is in conformity to the work done by (Akinsanya*et al.,* 2007). The occurrence of some of these parasite species in more than one fish host is also indicative of similar diets feeding habits and patterns among the fresh water fishes. Further studies are still required to establish the changes in environment, whether natural or manmade and to proffer probable biological control of these parasites.

In conclusion, evidence of heavy parasitic helminth infections were observed in *C. nigrodigitatus* though no apparent pathological effect was observed, however this has a number of public health implications. First, the presence of high parasite load in the fish can affect the normal growth and development of the fish resulting to stunted growth and thus reduce the market and nutritional values of the fish. Second, human consumption of raw or partially cooked fish is increasingly becoming a common practice in many parts of the world. Consequently the consumption of parasitized fish might predispose man to zoonotic infections that could have severe health consequences. Thus, infected fish when bought for human consumption should be washed properly to get rid of the infective stage. Consumption of raw to partially cooked fish should be discouraged, if possible avoided. Boiling of the fish to temperatures that kill the parasites before consumption is also recommended. Proper management of the fish in terms of infection management such as infection prevention, control and treatment measures is hereby advocated to prevent the outbreak of the parasites. The fish habitat (water body) also plays an important role in parasite infection management, therefore indiscriminate dumping of domestic and industrial wastes into aquatic habitat, washing, bathing and even littering of water bodies should be discouraged.

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