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Full Length Research Paper

Parasites of landed fish from Great Kwa River, Calabar, Cross River State, Nigeria

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Parasites of landed fish from the Great Kwa River, Calabar, Cross River State, Nigeria were studied. Parasitological examination of 180 fish samples belonging to 9 taxa from the River showed 50% incidence for *Chrysicthys nigrodigitatus,* 16.67% for *Heterotis noloticus, Clarias gariepinus* and *Tilapia galileaus* respectively and 0% for *Hepsetus odoe, Arius gigas, Momyrus rume, Ethmalosa fimbriata* and *Cynoglossus senegalensis*. Parasite infestations were found in the stomach and intestine, and no parasites were found on the fins, skin and gills. Nematodes, cestodes and protozoan were found in decreasing order of abundance. Diphyllobothrium sp. was found in the intestine of *C. nigrodigitatus*; *Camallanus* sp. was found in the intestine of *H. niloticus* and *T. galileaus* while protozoan cysts were found in the intestine of *C. garipinus.* Parasites were more prevalent in the fish of 30 to 39.9 cm total length size range. The study determined that in the Great Kwa River the preferred organs of parasites were the intestines and stomach.

Key words: Parasites, landed fish, Great Kwa River.

INTRODUCTION

Fish are important source of income and food in Nigeria and other countries in the sub-Saharan Africa, where some 35 million people depend wholly or partly on the fisheries sector for their livelihood (FAO, 1996). In Nigeria, consumption and demand for fish protein is increasing due to its affordability. Parasites play an important role in the ecology of aquatic ecosystems as well as in the aqua - and mariculture industries. Apparently, the origin of most diseases in mariculture is likely to be the wild-caught fingerlings or juvenile fish (Martens and Moens, 1995). In Nigeria, the vast majority of the supply of fish comes from river systems where fish are landed at fishing jetties and purchased for distribution by large and small scale fish dealers.

Parasites of fish are a concern since they often produce a weakening of the host`s immune system thereby increasing their susceptibility to secondary infections, resulting in the nutritive devaluation of fish and subsequent economic losses (Onyedineke et al., 2010). In fish culture systems, parasites have often been implicated as the main cause of economic losses (Khalil and Polling, 1997) and parasite species found to cause none or limited pathological damage in wild fish may, under conditions of mariculture, become pathogenic (Diamant and Paperna, 1986; Overstreet, 1978). The possibility of disease transmittal from fish to humans through fish consumption is a public health concern (Ibiwoye et al., 2006). Kabata (1985) reported that *Clinostomum* (Acanthocephalans) when ingested with poorly cooked fish is capable of producing laryngoharyngitis which is an unpleasant inflammatory condition. Parasite infection of the body cavity and the

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musculature of fishes have been reported as presenting marketing problems for commercially exploited species (Petersen et al., 1993). For instance, heavy infestation of the Alaska Pollack *Theragra chalcogramme* with pleroceroid of *Nybelinia surmenicola* has reduced the consumable part of the fish to the dorsal musculature (Grabda, 1977). Similarly, infestation with plerocerocoids of *Gymnorlynchus thyrsitae* has seriously affected the exploitation of the highly valued *Thyrsite atun* in New Zealand (Mehl, 1970).

The Great Kwa River is one of the major tributaries of the Cross River Estuary. It takes its rise from the Oban Hills in Nigeria, flows southwards and discharges into the Cross River Estuary around latitude 4°45'N and longitudes 8°20'E (Akpan, 2000). With increasing population pressure associated with the Export free zone status of Calabar, human settlement and industrial layouts are expanding rapidly into the freshwater and mangrove swamps of the Great Kwa (Akpan, 2000). Important fish species are, for example, bonga, *Ethmalosa fimbriata* and the estuarine catfish, *Chrysichthys nigrodigitatus* while the main shrimp species are *Macrobrachium macrobrachion*, *Macrobrachium vollenhoevenii*, *Penaeus notialis* (post larval stages), *Nematopalaemon hastatus, Parapenaeopsis atlantica* and *Exhippolysmata hastatoides* (Holzlöhner, 1996).

Various studies have been carried out on fish parasites from different bodies of water in Nigerian (Ekanem, 2010; Obiekiezie, 1995; Ekanem and Obiekiezie, 2000; Onwuliri and Mgbemena, 1987; Anosike et al., 1992*;* Ezenwaji and Ilozumba, 1992; Aken'ova, 1999; Auta et al., 1999; Okaka, 1999; Emere, 2000; Ibiwoye et al*.,* 2000, 2004; Olurin and Somorin, 2006; Akinsanya et al*.,* 2007). This study investigated the parasites of landed fishes from the Great Kwa River in Calabar and the possible health implications to fish consumers.

MATERIALS AND METHODS

Study area

The Great Kwa River is one of the major tributaries of the Cross River Estuary. It takes its course from the Oban Hills in Aningeje, Cross River State, Nigeria which flows southwards and discharges into the Cross River Estuary around latitude 4°45^{O}N and longitude 8°20^{O}E (Akpan, 2000). The lower reaches of the river drain the eastern coast of the Calabar municipality, the capital of Cross River State of Nigeria (Figure 1).

Field sampling

A total of 180 fish specimen belonging to 9 taxa were collected from the study area in a period of four months (5 specimens monthly for each taxa). The fish were collected with the aid of fishers using gill, lift and, cast nets, as well as wire and basket traps of various mesh sizes. A combination of capture methods were employed to get all sizes of the target species. Sampling was carried out in the main river channel and fish were transported to the Fisheries and Aquaculture Laboratory, University of Calabar, for identification and examination.

Examination of samples for ectoparasites

Scrapings from the fins, skin and gills of the fish specimen were smeared on clean glass slides, covered with cover slides and examined under light microscopes for ectoparasites. Some parasites were collected and fixed in 4% phosphate buffered formalin (PBF) for further processing and species identification (Paperna, 1980; 1996). Each sample was examined independently for parasites according to the protocol outlined in Obiekizie and Ekanem (1995). Skin scrapings and wet mounts from fins, skin and gills were examined for abundance and distribution of ectoparasites. Identification of parasites was carried out according to Yamaguti (1961), Roberts (2000), Obiekezie and Engenihi (1988) and Obiekezie and Ekanem (1995).

Examination of samples for endoparasites

The cavity of each fish was cut opened ventrally with a pair of scissors and the internal organs removed for examination. Organ squash of some organs (liver, spleen, heart, kidney) were made and examined as wet mounts under the microscope while other parts were fixed in PBF for isolation, and identification of parasites ((Paperna, 1980, 1996).

Determination of percentage incidence of fish parasites

The percent incidence of both ecto- and endoparasite were calculated according to Tombi and Bilong (2004).

Percentage incidence (%) = (n/N) x 100

Where, n is the number of individual parasites species isolated, N is the total numbers of parasites isolated from individual fish.

RESULTS

Of one hundred and eighty fish samples examined in 9 taxa, only 4 species were infested with parasites including: *Heterotis noloticus, Chrysicthys nigrodigitatus, Clarias gariepinus* and *Tilapia galileaus* The parasites recovered were endoparasites including nematodes (round worm), cestodes and protozoans, all of which were found in the fish stomach and intestine. Table 1 shows fish species examined and the number infested.

Percentage incidence (Table 2) of parasites of fish examined shows that *H. niloticus* had 16.67%, *C. nigrodugitatus* (50.0%), *C. gariepinus* (16.67%,), *T. galilaeus* (16.67%) respectively.

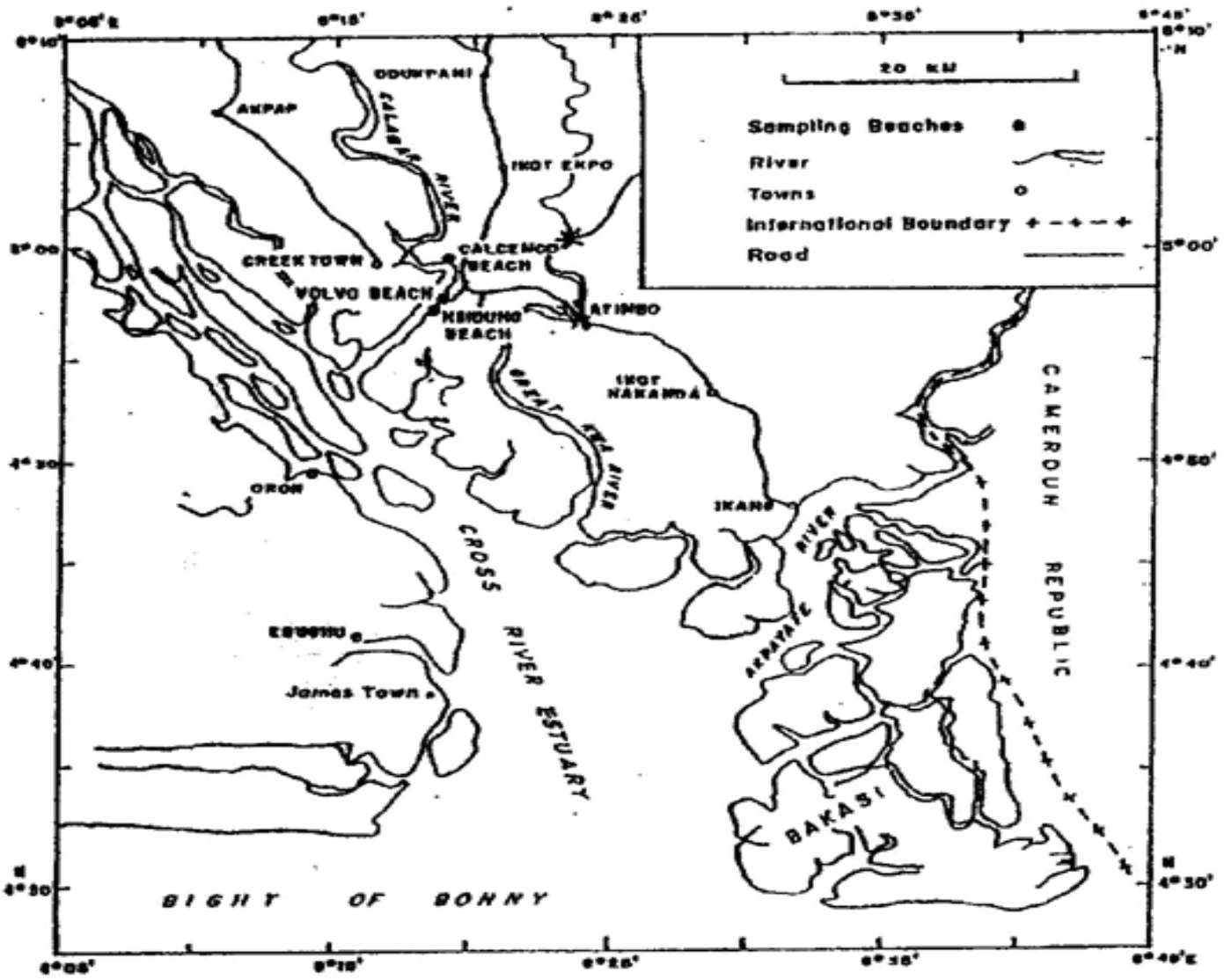

Figure 1. Showing study area.

Figure 1. Showing study area.

Numerical abundance of parasites of fish examined

Numerical abundance of parasites (Table 3) revealed that a total of 10 species of parasites occurred in the landed fish examined; 2 in *H. niloticus,* 5 in *C. nigrodigitatus*, in *C. gariepinus* and 1 in *T. galilaeus.* No parasite occurred in *H. odoe, A. gigas, M. Rume, E. fimbrata* and *C. senegalensis. H. niloticus* was infested with one nematode (*Camallanus*) found in the intestine and one cestode (*diplyllobortmium*) found in the stomach; C. *nigrodifitatus* was infested with two nematodes (*Camallanus*) in the stomach and intestine, two cestodes (*Diphyllobortmium*) in the intestine and one protozoan cyst in the intestine. *C. gariepinus* examined had a total of 2 parasites which were roundworm (*Camallanus*) in the intestine while *T. galilaeus* had one protozoan cyst is the intestine.

Prevalence of parasites In relation to fish standard length (cm)

The prevalence of parasites of landed fish (Table 4) showed that parasites were most prevalent in *C. nigrodifitatus* in length Class 20-29.9 cm with 4 parasites followed by *C. gariepinus* in length class 20-29 cm with 2

Table 1. Fish species examine and number Infested.

Fish species	Number examined	Number infested
Heterotis niloticus	20	1
Chrysicthys nigrodigitatus	20	3
Hepsetus odoe	20	0
Arius gigas	20	0
Momyrus rume	20	0
Etmalosa fimbriata	20	0
Cynoglossus senegalensis	20	0
Clarias gariepinus	20	1
Tilapia galilaeus	20	1
Total	180	6

Table 2. Percentage incidence of parasites**.**

Fish species	Number infested	% Incidence
Heterotis niloticus	1	16.67
Chrysicthys nigrodigitatus	3	50.00
Clarias gariepinus	1	16.67
Tilapia galilaeus	1	16.67
Total	6	100

Table 3. Numerical abundance of parasites of landed fish from the Great Kwa River. (G = Gills, F=Fin, Sk =Skin St = Stomach, I = Intestine).

Fish species	Nematode					Cestode					Protozoan cyst					
	G	F	SK	ST	I	G	F	SK	ST	I	G	F	SK	ST	I	Total
H. niloticus	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2
C. nigrodigitatus	0	0	0	1	1	0	0	0	0	2	0	0	0	0	1	5
African pike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marine catfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M. rume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E. Fimbrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cynoglossus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C. gariepinus	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
T. galilaeus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	0	0	0	1	4	0	0	0	0	3	0	0	0	0	2	10

parasites and *H. niloticus* in length class 30 to 39.9 cm with 2 parasites each while *C. nigrodigitatus* of length class 30-39.9 cm and *T. galileaus* in length class 10 to 19.9 cm showed the lowest prevalence.

DISCUSSION

Results obtained from the present study shows a low infection rate of about 3.33% in fish genera examined, with all recovered parasites being endoparasites; nematodes, protozoan and cestodes. The only species of fish infested were *H. niloticus, C. nigrodigitatus, C. gariepinus* and *T. galilaeus.* The present study revealed that *C. nigrodigitatus* had the highest percent incidence of the infested fishes, while no incidence of ectoparasite and endoparasite was recorded in *H. odoe, A. gigas, M. rume, E. fimbrata and C. senegalensis*. This is similar to

Table 4. Prevalence of parasites in relation to fish standard lengths (cm) in a) *Heterotis niloticus,* b) *Chrysicthys nigrodigitatus* c) *Clarias gariepinus* and d) *Tilapia galilaeus*.

Standard length (cm)	No. and % of fish examined	No. and % of fish infested	Total No. and % of parasites recovered
		Heterotis niloticus	
10 – 19.9	4(20)	0(0.0)	0(0.0)
20 – 29.9	10(50)	0(0.0)	0(0.0)
30 – 39.9	6(30)	1 (100.0)	2(100.0)
Total	20(100)	1(100.0)	2(100.0)
		Chrysicthys nigrodigitatus	
10 – 19.9	8(40)	0(0.0)	0(0.0)
20 – 29.9	8(40)	2(66.67)	4(80.0)
30 – 39.9	4(20)	1 (33.33)	1(20.0)
Total	20(100.00)	3(100.00)	5(100.0)
		Clarias gariepinus	
10 – 19.9	4(20)	0(0.0)	0(0.0)
20 – 29.9	6(30)	0(0.0)	0(0.0)
30 – 39.9	10(50)	1(100)	2(100)
Total	20(100)	1(100)	2(100)
		Tilapia galilaeus	
10 – 19.9	14(70)	1(100.0)	1(100)
20 – 29.9	6(30)	0(0.0)	0(0.0)
30 – 39.9	0(0.0)	0(0.0)	0(0.0)
Total	20(100.0)	1(100.0)	1(100)

the low infection rate (13.6%) reported elsewhere in Imo River (Ugwuozor, 1987). The low infestation rate in these fishes could be attributed to the sanitary condition of the river, the location of the river from residential areas, number and class of people visiting the river and their purposes. Number of nematodes isolated was higher than cestodes, and protozoans. Nematodes are known to occur in body cavities or found penetrating subcutaneous tissues. Host specificity of nematodes agrees with the findings of Akinsanya et. al., (2007). Ukoli (1965); Olurin and Somorin (2006) recovered *Clinostomum* sp from the intestines of tilapia fishes. In the present study, *Clinostomum* was not found parasitizing cichlid species (*T. Galilaeus*) and non-cichlid species such as *H. niloticus, C. nigrodigitatus, H. odoe, A. gigas, M. rume, E. fimbrata, C. sensgalensis* and *C.gariepinus*.

Kabata (1985) reported that *Clinostomum* (Acanthocephalans) when ingested with poorly cooked fish is capable of producing laryngopharyngitis which is an unpleasant inflammatory condition in man. No Acanthocephalans were found in the intestine of the examined fish which disagrees with the findings of Awachie (1965) and Olurin and Somorin (2006) in fishes from Kainji Lake and Owa stream respectively. A Higher number of parasites were found in the intestines than other organs which could be associated with the fact that most digestive activities take place in the intestine resulting in the release of parasite ova/cysts in food particles. No parasite was found on the gills, skin and fins and this observation could be attributed to the continuous movement of water current over the gills skin and fins which may not encourage anchoring and survival of parasites on such locations. Comparing the prevalence of parasites in relation to length classes for all the species, 30-39.9cm (standard length) recorded the highest number of parasites recovered. This might be attributed to large amount of food intake by the animals. However, *C. nigrodigitatus* of length class 20-29.9cm recorded the highest prevalence of parasitic infestation when the species were compared individually.

In conclusion, although low incidence of landed fish parasites were recorded in the Great Kwa River, landed fish from this location should be properly cooked to avoid ingestion of parasites by fish consumers.

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