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Gut Parasites of *Chrysichthys nigrodigitatus* (Lacepede: 1803) and *Hydrocinus vittatus* in Ebonyi River Flood System, Southeastern, Nigeria

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Abstract
A survey of common gut parasites of wild fishes was carried out in Ebonyi River. 100 samples of wild fishes, 50 samples of *Chrysichthys nigrodigitatus* and 50 samples *Hydrocinus vittatus* were collected and examined using parasitological procedures for gut parasites. Three species of gut nematode parasites *Procamallanus laeviconchus, Capillaria, and Camallanus* were identified, *Diphyllobothrium latum* a parasitic cestode and parasitic protozoans *Dactylogrus, Trichodina* and *Eimeria chrysichthyii* were identified. 36 out of the total sample harbored the parasites. Bigger size fishes generally were more infected than smaller ones. More females were infected than males with a total percentage (50%) of the female population in the survey while male were infected lower than female (47.36%) of the male population in the survey. No pathogenic effect was seen on the infected fish, however the parasites are suspected to cause growth impairments on its hosts and even have reduced meat quality. The parasites infection can pose a public health danger due to consumption of improperly cooked fish.

1. Introduction

Parasitism reflect a lifestyle whereby one or more individual organism (the parasite) lives in close obligate association in or another (the host), and derives benefit such as nutrition at the host's expense, usually without killing the host. Parasites belongs to many different phylogenetically distinct taxa, and as such display a variety of life histories and body forms. Virtually every species of free living organism has parasites indeed; there may be more species of parasitic organisms than of free living ones (Price, 1980). Thus, parasites contribute significantly to biodiversity simply in terms of the number and variety of species in existence.

Many parasites posses complex life cycle in that they have larval stage that infect intermediate hosts, where growth or development occur, and definitive host, where maturation's and sexual reproduction occurs. Transmission between those hosts in a life cycle may be through free living infective stages or via predation by one on the previous host in the life cycle. Due of their complex life cycle, parasites are indicative of many different aspects of their host's biology, such as diet, migration recruitment, population distinctness, and phylogeny (Williams *et al.*, 1992). They also may be good indicators of environmental contaminants and stress (Mackenzie *et al.*, 1995). Different parasites have a variety of intermediate hosts and often depend on tropic interactions for transmission. So

parasite, within a vertebrate host may be excellent Indicators of food-web structure and biodiversity (Marcogliese and Cone, 1997). Moreover, parasites may be important in regulating the abundance of host populations through parasites induced mortality of heartily Infected hosts (Anderson and May, 1979). Parasites can be divided into micro parasites and Macro-parasites on the basis of size the micro-parasites include viruses, bacteria, fungi, Protozoan and Myxozoans. Surveys for micro-parasites generally include only protozoa and Myxozoa. Macro-parasites are larger multicellular organisms mainly comprised of the helminth and anthropods. Helminth includes monogenea, Trematoda (Flukes), cestoda (Tapeworm). Nematode (Roundworms) and Acanthocephala (Thorny-Headed-Worms). Arthropod parasites of vertebrate in fresh water are represented mainly by the copepoda. Endo-parasites are those sequestered in internal organs or cavities of a host and ecto-parasites are those found on external surfaces such as skin or gut and gills. It is impossible to complete a parasites survey to find most Endo-parasites without killing the host (Arthur and Albert, 1994). Any sampling program for parasites first requires a sampling program for members of the host populations. Methods for collecting free-living organisms of various species, during any sampling effort for parasites, care should be taken those members of the host population within any particular category (Ash and Orihel, 1991). Although this guide is aimed principally at parasites of wild fishes, it also may be applied to other vertebrate host groups. E.g. (Amphibians). The gut parasites are intestinal parasites that populate the gastro-intestinal tract in humans and other animals including fish. An intestinal parasites lives in the intestines (guts). Intestinal parasites are usually protozoa (such as Giardia) or worms (such as pinworms or tapeworms) that get into the body and uses the intestine as shelter. The parasites will live in the intestine or other parts of the body and often reproduce. Therefore, this study seeks to determine or identify the various parasites that can infect *Chrysichthys nigrodigitatus* and *Hydrocinus vittatus* in Ebonyi river, to compare the prevalence of infection to their sex, sizes, and to determine the relationship between their gut length and parasitic infection.

2. Materials and Methods

2.1. Study Area

Ebonyi River flows from the northern to southern Ebonyi state where it empties into Cross river. The river is widely used by the community as a source of water for domestic, agricultural and fishing purposes as shown in Fig. 1. The Ebonyi river basin is known to support agricultural and fishery activities and also serves the communities for other domestic purposes. There is a market near the river where farmers take their fishes and other farm products like cassava, yam, rice, vegetable and pepper, thus farming and fishing forms the dominant occupation of people around the basin. During the dry season, the water level is reduced, and the people engage in excavation of sandy soil from the river for sale.

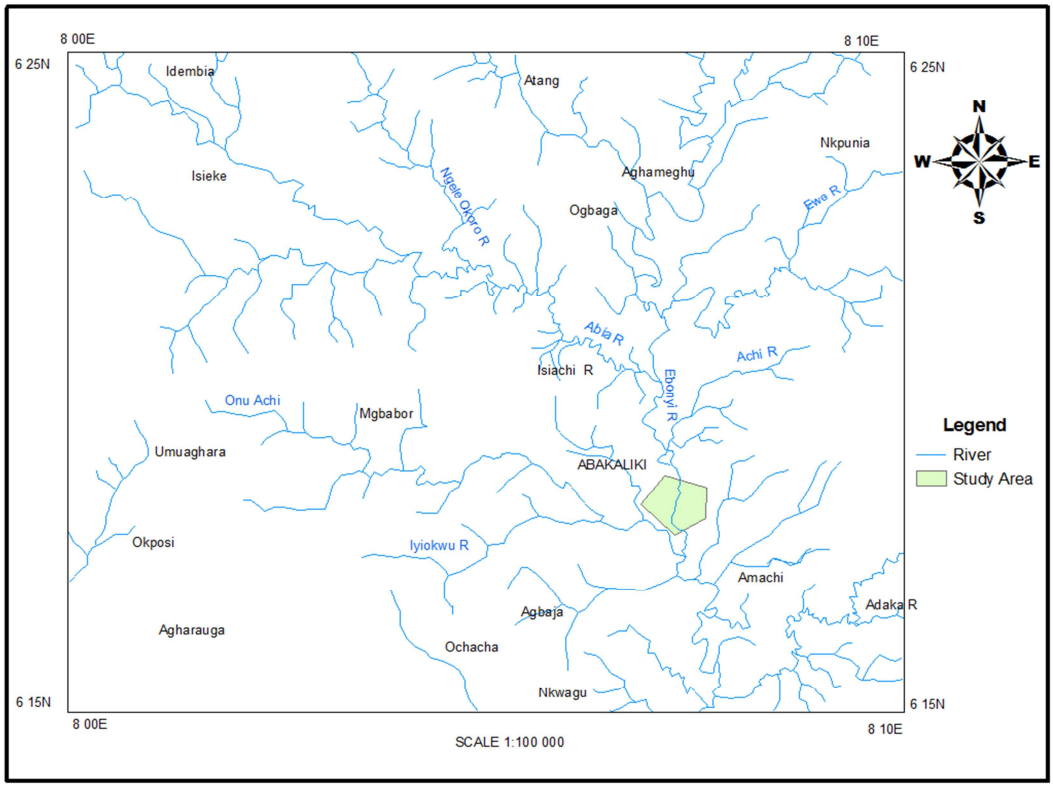

Fig 1. *Map of Ebonyi river showing study area.*

2.2. Sample Collection and Identification

A total of 100 fish samples were collected from Ebonyi river from August to September 2013. The fishermen services were utilized at the study area (Ebonyi River) who caught the fish using the net, cast nets, dreg nets of various size between (40mm and 90mm), set net between (75mm and 90mm) and long lines. Other gears used include baskets and traps. The fishes were bought from fishermen who caught the fishes using cast nets. The fishes were transported in a plastic bucket containing clean water to the Applied Biology Laboratory to be examined for gut parasites. The total and standard lengths were measured using a meter rule. The weight of the fishes were also taken using a weighing balance. Identifications were done using the methods of Holden and Reed (1972) and Olaosebikan and Raji, (1998).

2.3. Laboratory Analysis

The laboratory examination of the fish was done by introducing about 10-15ml of physiological saline was introduced into the cavity and gill chamber of both fishes to extract the gut parasites. This was done to rinse both the cavity and gill chamber and embedded it for 5 minutes for maximum extraction. Thereafter samples collected from the exercise were poured into a glass beaker for proper sedimentation between 3-6 hours. The sediment were thereafter centrifuged with centrifuge machine model (HNS II CFC 301) at 1500rpm for 10 minutes after which the supernatant were smeared on a glass slide and covered with cover slip for microscopic examination of the parasites eggs, larva of the gut parasites with x10 and x40 objective respectively. The gut were dissected out and put straight in a clean Petri-dish. Each section of the gut (stomach, intestine and esophagus) was examined for parasites. These various regions were carefully opened into separate Petri dishes and the content was thinly spread on a slide and covered with cover slip and examined under the microscope with a magnification of x40. Parasites isolated were put in a clean universal container, containing normal saline to clear fatty bodies of host fishes. Identification of parasites was done using principle from (Ash and Orihel, 1991).

2.4. Analysis and Data Representation

Analysis and date representation of each parasites recovered were done using statistical method of Marcogliese and Cone, (1997) in which the terms prevalence and Mean Intensity were applied.

$$\text{Mean Intensity} = \frac{Number\ of\ parasites\ recovered}{Number\ of\ fish\ Infected}$$

$$\text{Prevalence} = \frac{Number\ of\ host\ Infected}{Total\ number\ of\ fish\ examined} \text{X}\ \frac{100}{1}$$

3. Results

A total of 100 fishes were examined 50 *C. nigrodigitatus* and 50 *H. vittatus*. Out of these, 20 (40.0%) *C. nigrodigitatus* and 16 (32.0%) *H. vittatus* were infected. 6 (12.0%) male samples of *C. nigrodigitatus* were infected with different parasites out of 20 samples while 14(28.0%) of female samples were infected out of 30 samples (Table 1). *H. vittatus* male samples had 6 (12.0%) infected out of 17 samples while female samples had 10 (20.0%) infected out of 33 samples (Table 2). Table 3 shows the prevalence of parasites in *C. nigrodigitatus* in relation to length and those within the length range of (12.5-14.5 and14.5-16.5) were mostly infected by the parasites, while small fishes had reduce parasites. The highest prevalence was recorded as (14.0) in 14.5-16.5 length range with the highest mean intensity in 16.5-18.5 as (1.5). The prevalence of parasites in *H. vittatus* in relation to length and those within the length range of (18.5-20.5) were mostly infected by the parasites. The highest prevalence was recorded as (12.0) in 18.5-20.5 length range with the highest mean intensity in 16.5-18.5 (Table 4). Some of the guts were damaged such that it was difficult to take their length. However, they were examined for parasites. From the tables 5 and 6, it is seen that gut length increases in the size of the fish and vis-à-vis parasitic infection.

Table 1. *Prevalence of gut parasites identified in C. nigrodigitatus in relation to sex.*

Sex	Number examined	Number infected	% Infection	Parasites isolated From both sexes
Male	20	6	12.0	*Procamallanus laeviconchus Diphvllobothrium latum Trichodina sp*
Female	30	14	28.0	*Camallanus sp Capillaria sp Dactylogyrus sp Eimeria chrysichthyii*
Total	50	20	40.0	

Table 2. *Prevalence of gut parasites identified in H. vittatus in relation to sex.*

Sex	Number examined	Number infected	% Infection	Parasites isolated from both sexes
Male	17	6	12.0	*Camallanus sp Coccidia sp*
Female	33	10	20.0	*Procamallanus laeviconchus Diphvllobothrium latum Trichodina sp Capillaria sp Trichodina sp*
Total	50	16	32.0	

Table 3. *Prevalence of gut parasites in C. nigrodigitatus relation to length.*

Length range(cm)	Number examined	Number infected	Number of parasites recovered	% Prevalence	Mean intensity
8-5-10.5	12	2	1	4.0	0.5
10.5-12.5	8	2	2	4.0	1
12.5-14.5	10	5	2	10.0	0.4
14.5-16.5	16	7	4	14.0	0.57
16.5-18.5	4	4	6	8.0	1.5
Total	50	20	15	40.0	3.97

Table 4. *Prevalence of gut parasites in H. vittatus in relation to length.*

Length range (cm)	Number examined	Number infected	Number of parasite recovered	% Prevalence	Mean intensity
12.5-14.5	10	1	0	2.0	0
14.5-16-5	13	3	2	6.0	0.66
16.5-18.5	8	2	6	4.0	3
18.5-20.5	12	6	4	12.0	0.66
20.5-22.5	7	4	2	8.0	0.5
Total	50	16	14	32.0	4.82

Table 5. *Relationship between gut length and parasites infection in C. nigrodigitatus.*

Gut length (cm)	Number examined	Number infected	% Infection
1-25	18	4	8.0
26-50	10	6	12.0
51 and above	14	8	16.0
Total unmeasured	8	2	4.0
Total	50	20	40.0

Table 6. *Relationship between gut length and parasites infection in H. vittatus.*

Gut length (cm)	Number examined	Number infected	% Infection
1-25	15	2	4.0
26-50	14	8	16.0
51 and above	13	4	8.0
Total unmeasured	8	2	4.0
Total	50	16	32.0

4. Discussion

This study has revealed the occurrence of gut parasites which are nematodes, cestodes and protozoans parasites in the important fish species in Ebonyi River namely, *Procamallanus laeviconchus, Capillaria, Camallanus, Diphyllobothrium latum, Dactylogyrus, Trichodina and Eimeria chrysichthyii.* The parasites encountered in this study have been noted for roaming around in the gut of the fish where it could graze on nutrients (Onyie *et al.,* 2004). This may cause some discomforts to the fish by reducing the amount of nutrient absorbed by the intestinal wall of the fish and thus reduce or impair growth in the fish. This is in contrast with *Monobothrium* spp, which have been noted for penetrating the intestinal and provoke nodule formation with pronounced inflammatory reaction and necrotic debris (Williams *et al,* 1992). The *Polyonchobothrium chrysichthys* which penetrates the gall bladder mucosa of the fish and initiates the formation of nodules in the fish (Paperna, 1996) and the Acanthocephalans that penetrate the epithelial mucosa with their proboscis causing damages, this corresponds with the extent or the depth of penetration of proboscis (Paperna, 1996). There was little difference in the degree of infection between the sexes. The females were more in number in the samples collected and they show a higher degree of infection than the males. This agrees with the findings of Mhaisen *et al.* (1988) and Ibinoye *et al.* (2004). An increase in size is a reflection of increase in weight and length. It was discovered that infection was more prevalent in the bigger fish than in the smaller ones. This discovery agrees with earlier surveys of Azugo (1978), Barker and Cones (2000) and Onyie *et al.* (2004) and Ibinoye *et al.* (2004). The number of fish with higher gut weights and lengths show a higher percentage infection. No reason can be deduced for this except for the correspondence of the gut sizes with size of fish. The recovery of the nematode *Procamallanus laeviconchus* suggests that the fish fed on copecods, which serve as intermediate hosts for these parasites. This agrees with the work of Moravet (1974) in which it was discovered that many of the *Camallanidae* to which *Procamallanus* belongs are harbored by intermediate hosts like copepod. The presence of the Cestodes and protozoan parasites could be because of the ecological factors or that they do infect fish from the area or place of study. This agrees with the findings of Bauer (1965) that the fish environment is important and is the determinant of the type of

parasites that infect them.

In conclusion, this study showed that nematodes, cestodes and protozoans parasites inhabit guts of wild fishes in Ebonyi River and these parasite can affect the life of these fishes, particularly the bigger fishes. Infected fish if consumed will pose a public health problem to the consumers thus care must be taken in the consumption of wild fishes by proper cooking at a high temperature that kill the parasites and proper washing should be done to remove the infective stages of the parasites. Further research on the gut parasites of wild fishes from Ebonyi River is recommended, to include more samples and to be spread through dry and wet seasons. This may reveal more species of parasites compared to what is in the result in this present study.

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