IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 11, Issue 10 Ver. I (October 2018), PP 68-72
www.iosrjournals.org

Intestinalparasites of Oreochromisniloticus in Ebonyi River, Southeastern Nigeria: Implication for fish health policy and management

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Abstract: *The prevalence of intestinal parasites in Oreochromisniloticuswas investigated at Ebonyi River flood system from October 2015 to November 2015. Using standard parasitological analysis the incidence of intestinal parasites of O. niloticus was studied. Procamallanus (Nematoda) had the highest prevalence (9.32%) while Opisthochuspedicellantus and Monobothroideswoodlandii (cestoda) have the lowest prevalence of (0.62%) and (0.62%) respectively. Other parasites include Enterogyruscichlidarum(Nematoda), (3.1 I %),Acanthostomumspiniceps(Acanthocephalan),(4.97%)Clinostomumarthracanthus(3.73%), Clinostomumtilapiae (2.48%),Clinostomumpillariazederi (Trematoda) (1.86%), Unidentified Cestode larva (3.11%).The fish within the length range of 11.00-12.50 (TLcm) were most infected while those within the range of 9.00-10.50 and 15.00-16. 50 (TLcm) were less prone to infection. Samples with body weight with the range of 41-50.00(g) were most susceptible to infection. The distribution of parasites in relation to the various region of the body of wild Nile tilapia shows that most parasites that infect this species are mostly found in the stomach with (40%) followed by small intestine (35%) gills, (21%) and muscles (7%) but only (2%) of these parasites were found in the gall bladder. The prevalence of intestinal parasites of O. niloticusin Ebonyi River is as a result of anthropogenic activities, discharge of waste waters and products into the river due to poor sewage disposal. Therefore, the presence of helminthparasite might elicit some pathological effects on the wild Nile Tilapia retarding their growth, even causing death.*

Keywords*:Ebonyi River, intestinal parasites, Oreochromisniloticus, prevalence*

Date of Submission: 12-10-2018 Date of acceptance: 27-10-2018

I. Introduction

The Nile tilapia has distinctive, regular, vertical stripes extending as far down the body as the bottom edge of the caudal fin, with variable coloration. Adults reach up to 60 cm (24 inch) in length and up to 4.3 kg (9.5 lb). It lives for up to 9 years. It tolerates brackish water and survives temperatures between 8 and 42 °C (46 and 108 °F). It is an omnivore, feeding on plankton as well as on higher plants. Introduced tilapia can easily become an invasive species (Tilapia as exotic species). It is a species of high economic value and is widely introduced outside its natural range; probably next to the Mozambique tilapia (*O. mossambicus*), it is the most commonly cultured cichlid[1]. In recent research done in Kenya, this fish has been shown to feed on mosquito larvae, making it a possible tool in the fight against malaria in Africa. The Nile tilapia is an omnivore that feeds on both plankton and aquatic plants. It generally feeds in shallow waters, as harmful gases (such as carbon dioxide, hydrogen sulfide, and ammonia) and temperature fluctuations found in deep waters create problems for the physiology of the fish. The Nile tilapia thrives on the warmer temperatures commonly found in shallow waters compared to the colder environment of the deep lake. In general, tilapias are macrophyte-feeders, feeding on a diverse range of filamentous algae and plankton [2]. The Nile tilapia typically feeds during daytime hours. This suggests that, similar to trout and salmon, it exhibits a behavioral response to light as a main factor contributing to feeding activity. Due to their fast reproductive rate, however, overpopulation often results within groups of Nile tilapia. To obtain the necessary nutrients, night feeding may also occur due to competition for food during the daylight hours. A recent study found evidence that, contrary topopular belief, size dimorphism between the sexes result from differential food conversion efficiency rather than differential amounts of food consumed. Hence, although males and females eat equal amounts of food, males tend to grow larger due to a higher efficiency of converting food to energy[2]. [3]also recorded that Tilapia fishes carry their due quota of parasites fauna, not only the adult parasite but also the larva forms he also recorded 50 species of trematodes from15 families which occur in a variety of fresh water fish in Africa. Moreover, there are also other nematodes that parasitize wild nile Tilapia fishes and these are found from family (Amallanidae-*Procamallanuslaevinochus* and *Procamallanuscyathrophyrynx*). The fingerlings and young fishes are those that

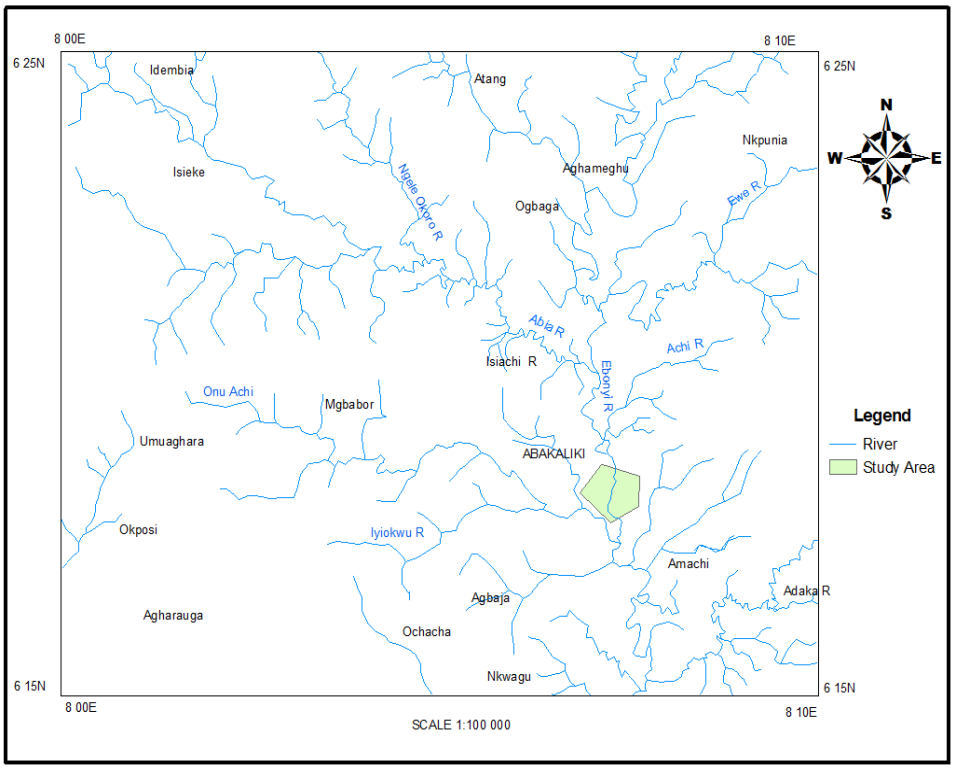
are most prone to infection under stressful condition [4]. According to [4], there are lots of factors which lead to the host specificity of endo-parasites which occur as a result of combination of physiological, chemical, genetic and ecological factors and all these render the host more sensitive to parasites. Poor water condition makes the fishes more prone to parasites so, it is also advisable to upgrade any less than optimal water quality condition was also observed that large body size fishes normally long-lived fish posses a well developed immunity against proliferation of endo-parasites therefore, the consumers should go for bigger fishes because smaller ones are more susceptible to infestation. Prevention is better than cure is true when it comes to viral or bacterial disease but it is not true when it comes to parasites since they are almost part of the normal fish environment so, avoidance is impossible and we have to learn how to live with them therefore, routine parasite screening of healthy: and sick fish is a major components of the prevention strategy. Thus this study seeks to determine the prevalence of infection in *O.niloticus* in the Ebonyi River, to compare the prevalence with the length (cm) and weight (g) of the fish and to assess the predisposing factor associated with the occurrence of the parasites in the fish.

II. Materials and methods

2.1 Study area

The Ebonyi River basin in this study is located in Izzi North local Government Area, Ebonyi State (Fig. 1). The river basin is located in the forest zone and the river is also affected by the seasons of the year, which is dry and raining season. During the raining season (April-October) the level of the water increases so rapidly and the water body becomes muddy due to the deposition of silt from the resultant flood and the water transparency is reduced while during the dry season/November- March, the water level reduces and transparency increases.

Figure 1. Map of Ebonyiriver showing study area



2.2 Sample collection

The fishes were bought from the fishermen who caught the fish using cast nets, hook and line, set net, long line, scope net and other fishery gears. The fishes were preserved in 10% formalin and transported to Faculty of Biological Science (Applied Biology) laboratory in Ebonyi State University.

2.3 Laboratory analysis

In the laboratory, the fishes were sorted out and identified to specie level using menu provided by [5]. The standard length of the fish (from the snout to the base of the caudal fin) and the total length (from the snout

to the tip of the caudal fin) were measured to the nearest length of centimeter using meter rule mounted on a dissecting board. The weight of each fish was measured to the nearest 0.1g on an electronic weighing balance. Each fish was assigned a reference number to facilitate reference. The sexes of the fish were determined only after dissecting the fishes and noting the presence of testes or ovaries. The intestines of individual fishes were cut open and examined for end parasites called intestinal parasites. The alimentary canals were dissected out and straightened in clean petri-dishes. Each section of the alimentary canal was examined for parasites. The various regions were carefully opened into a separate petri-dishes and the content was thinly spread on a slide, covered with a cover slip and examined under the microscope with a magnification of 10x10 respectively. The parasites isolated were put in a clean sampling bottle, which contains normal saline to clear the fatty bodies of host fish. The gall bladder and liver were also removed and the contents examined for parasites.Physiological saline floatation method and microscopy wereemployed according to [6]. The parasiteswere identified using guides provided by [7].

2.4 Analysis and data presentation

Analysis and data presentation of intestinal parasites recovered were done using Standard Parasitological statistical method of [8] in which the terms prevalence and mean intensity were applied.

Mean Intensity = No of Parasite recovered
No of fish infected
% No of fish Examined =No of fish Examined x100
Total No of Fish1
% No of fish infected = No of Fish Infected x 100
Total no of Fish Examined 1
% Prevalence= No of host Infected x 100
No of Fish Examined 1
The parasite - length/weight relationship was evaluated using Chi square analysis.

III. Results

The prevalence of intestinal parasite of *O. niloticus*(n=161) in Ebonyi River flood system. *Procamallanus* has the greatest (highest) prevalence of (9.32%) while *Opisthochuspedicellanus* and *Monobothroidswoodlandii* have the lowest prevalence of (0.62%) and (0.62%) respectively. Other parasites identified include *Enterogyrus*(3.11%), *Clinostomumarthracanthus* (3.73%) *C. Tillapiae* (2.48%) *C. pillariazederi* (1.86%) *Acanthostomumspiniceps* (4.97%) and unidentified cestoda larva (3.11%). Out of 161 fishes examined only 48 were infected(TABLE 1).

Table 1: Prevalence of intestinal parasite in Oreochromis spp. (n=161) in Ebonyi River

Parasite specie	Taxonomic group	No. of fish infected	% prevalence	Total no. of parasites
Enterogyrus cichlidarum	Nematoda	25	3.11	7
Procamallamus leavinoschus	Nematoda	15	9.32	22
Unidentified Cestode larva	Cestoda	5	3.11	9
Acanthostomum spiniceps	Acanthocephala	8	4.97	32
Clinostomium arthracanthus	Nematoda	6	3.73	19
C. tilapiae	Nematoda	4	2.48	08
C. pillariazederi	Nematoda	3	1.86	4
Opisthochus pedicellatus	Trematoda	1	0.86	2
Monobothroides woodlandii	Cestoda	1	0.62	2
Total		**48**	**29.81**	**105**

The pattern of intestinal infection in *O.niloticus* in relation to their standard length (SL). the fish samples within the range 11.00-12.50cm SL were most infected (12.42%) while those within 9.00-10.50cm and 15.00-16.50cm SL were least infected (3.11%) respectively, ($X^2 = 4.86$, df = 3). (TABLE 2).

Table 2: Intestinal parasite infection in*O.*niloticus in relation to their standard length (cm)

Standard length (cm)	No/% of fish examined	No/% of fish infected	% Prevalence of parasite
9.00-10.50	25(15.52)	05(20.00)	3.11
11.00-12.50	56(34.78)	20(35.71)	12.42
13.00-14.50	70(43.48)	18(25.74)	11.18
15.00-16.50	10(6.21)	05(50.00)	3.11
Total	161(100)	48(29.81)	29. 81

The pattern of intestinal infection of *O.niloticus* in relation to their body weight (g). This reveals that those within the range of 41-50.00g had the highest prevalence (13.6%) and those within the range of 21-30.00g has the least prevalence (1.86%), (X^2 =4.47 ,df = 3)(TABLE 3).

Table 3: Pattern of intestinal infection in *O.niloticus*in relation to their body weight (g)

Body weight (g)	No/% of fish examined	No/% of fish infected	%Prevalence of fish parasite
21-30.00	18(11.18)	03(16.66)	1.86
31-40.00	48(30.69)	17(3469)	10.56
41-50.00	64(39.75)	22(34.38)	13.66
51-60.00	30(18.68)	06(20.00)	3.72
Total	161	48	29.81

The distribution of parasites in the various regions of the gut of the *O.niloticus* showed that parasites ofwere mostly found in the stomach with (40)followed by small intestine (35), gills (21) and muscles (7) but only (2) of those parasites are found in the gall bladder (Fig. 2).

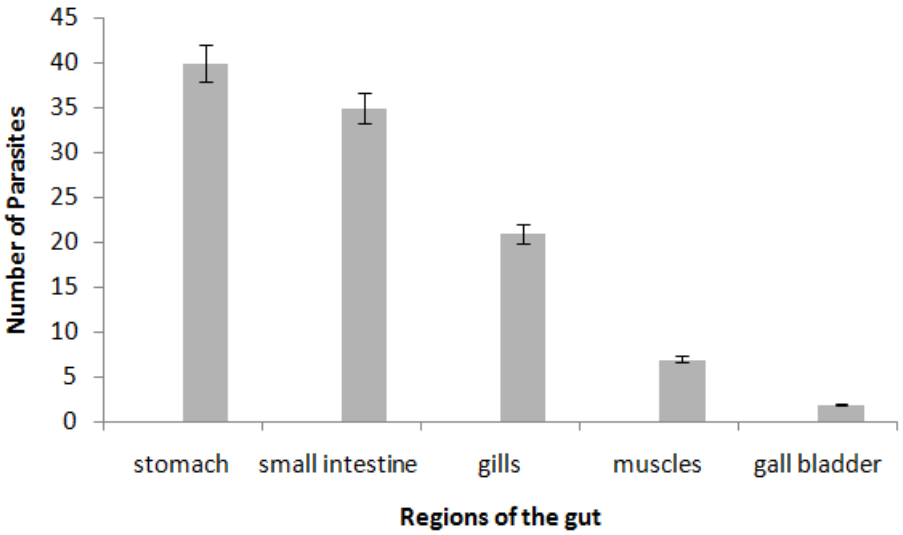


Figure 2. Distribution of parasites in the various regions of the gut

IV. Discussion

The results presented reveal that out of 161 fishes examined only 48 were infected. The parasites identified include: *Enterogyruscichlidarum* (nematode) (3.11%), *Procamallanuslaevinochus* (nematode) (9.32%), *Acanthostomumspiniceps*. (acanthocephala) (4.97%) *Clinostomum, arthracanthus* (3.37%), *Clinostomumtilapiae* (2.28%) *C. pillariazederi*(1.86%), *Opisthochuspedicellatus*(0.62%), *Monobothroideswoodlandii* (cestoda) (0.62%) and unidentified cestode larva (3.11%). The overall prevalence of intestinal parasite observed in this study was 29.81%. The result showed that *P. laevinochus* had the highest prevalence of 9.32% while *O.pedicellatus* and *M.woodlandii* had the lowest prevalence of 3.11% respectively. There was no protozoan probably because of the ecological factor of the area of the study which is in agreement with [9] and [10] that parasitism varies from one aquatic ecosystem to the other. [11]and[12] suggested that the difference could be due to host- parasite relationship and abiotic factors. The recovery of nematode *P. laevinochus* suggests that the fish feed on copepods which serve as an intermediate host for this parasite [13],

[14] and [15].This work reveals that wild Nile Tilapia(*O.niloticus*) within the range of 11.00-12.50cm were more prone to parasitic infection as much it is advisable to go for bigger fishes above 15cm SL and the smaller ones less than 10cm SL. The same thing is applicable to the body weight because as the body weight increases above 50g the intensity of the infection decreases and fish with weight less than 30g. The difference in the intensity of infection between the juvenile and the adult fish as related to their standard length (cm) and body weight (g) may be due to change in diet from weeds, seeds, phytoplankton to insect larvae, snails, crustaceans, worms and fish in both juvenile and adult-hood as observed by [16]. Findings of this work specifically observed that eight (8) species of parasites were found in *O. niloticus*, six (6) out of the eight were identified with the classes they belong to while two (2) was unidentified. Moreover, the distribution of parasites in relation to the various region of the body of wild Nile Tilapia shows that most parasites that infect this specieswere mostly found in the stomach and small intestine but are less in the gall bladder. Consumers are advised to remove these parts (stomach and small intestine) before cooking. An infected fish may transmit diseases to man resulting to poor public health [9].

V. Conclusion

This work reveals the presence of intestinal parasites in*O. niloticus*ofEbonyi River.Fish in aquaculture are more susceptible to parasitic infection, therefore fish farmers are advised to pay adequate attention to the11.00-12.50cm SL stage and care should also be taken when handling these juvenile stages. The consumer is also advised to always go for the bigger fish than the smaller one. There is need to be careful of the fact that consumption of raw or improperly cooked fish from this river should be avoided for the prevention of the outbreak of zoonotic infections and diseases and landed fish should be properly cooked to avoid ingestion of parasites by fish consumers and stall zoonoses in humans.

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*UnekeBilikisIyabo. "Intestinalparasites of Oreochromisniloticus in Ebonyi River,Southeastern Nigeria: Implication for fish health policy and management" IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) 11.10 (2018): 68-72.