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Gills and Intestinal Parasites of Cichlids in Uke River, Karu Local Government Area of Nasarawa State, Nigeria

[1]Banyigyi, H.A., *[2]Ameh, S.M. and [1]Obaje, I.A.

[1]Department of Zoology, Faculty of Natural and Applied Sciences, Nasarawa State University Keffi, Nigeria.
[2]Department of Biology, Faculty of Science, Confluence University of Science and Technology Osara, Kogi State, Nigeria.
*samuelameh328@yahoo.com; amehsm@custech.edu.ng

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ABSTRACT

The gills and intestinal parasites of Cihlids fishes in Uke River, Karu Local Government Area of Nasarawa State, Nigeria was investigated in this study. The fishes used for the study were collected fresh from fishermen at Uke River and brought immediately to the Laboratory for parasitic examination at the Department of Zoology, Nasarawa State University, Keffi, Nigeria. A total of 112 fishes were collected for parasitic examination between July and September 2019. The gills were cut out and placed on separate petri dishes for gill parasites examination, while the abdomen was cut open to remove the intestinal tract for intestinal parasites examination. The intestinal tract was sectioned into the oesophagus, stomach, and rectum. Eleven (11) out of the 112 fishes were found to be infected with parasites and a total number of fourteen (14) parasites were isolated belonging to three (3) species (Eimeria spp, Huffmanella spp and Eutrongylides spp). A total of nine (9) Eimeria spp, three (3) Huffmanella spp and two (2) Eustronglides spp were isolated. Eimeria spp and Eustronglides were isolated from the gills, while Huffmanella spp were isolated from the intestine. Although there was low incidence of parasitic infection, there is no doubt that the infection rate was significant to elicit some pathological effects on fishes by retarding their growth, cause death and a reduction in market values.

1. INTRODUCTION

Fishes are important sources of income and food in Nigeria and other countries in the sub-Saharan Africa where about 35 million people depend solely or partly on the fisheries sector for their livelihood (Ekanem *et al*., 2011). In Nigeria, the consumption and demand for fish protein is increasing due to its affordability and relatively high nutrient contents (Omoniyi and Ojelade 2017). However, fish production has been reportedly

low and unable to meet the demand of the ever-increasing human population due to many factors among which is the diseases caused by parasites (Omoniyi and Olofintoye, 2001; Olofintoye, 2006).

The health of fishes is affected by parasites which makes them susceptible to secondary infection by disease-causing organisms (e.g. bacteria, fungi and viruses). Apart from this, parasites compete for food thereby depriving the fish of essential nutrients and inhibiting the growth which could lead to morbidity and mostly with consequent economic loss (Olurin *et al.,* 2012).

Though, parasites play an important role in the ecology of aquatic ecosystems, including aquaculture, their effects on the nutritive devaluation of fish and subsequent economic losses have been reported (Onyedineke *et al.,* 2010). Several studies have revealed rich parasitic fauna in freshwater fishes (Auta *et al.,* 1999; Emere, 2000; Omoniyi and Olofintoye, 2001; Oniye *et al.,* 2004; Biu and Nkechi, 2013). These reports revealed that fish health, growth and survival were negatively affected in the water bodies. It has also been reported that fish culture could provide a large reservoir of parasitic pathogens common to both wild and cultured fishes (Bichi and lbrahim, 2009), but up till the present time, no epidemic of fish parasites has been reported in Nigeria. However, the Nigerian freshwater bodies need to be assessed and monitored for parasitic infections as culture of fishes is becoming more intensive and widespread and the consumption of these parasites could pose a serious health challenge to the consumers. Cichlids are among the most commonly caught fishes in the wild and widely acceptable in the market by the consumers in Nigeria. They are also among the most culturable fish species in pond culture system by many fish farmers. It is on this premise that this study was carried out to assess the parasites of Cichlid fishes in Uke River, in Karu LGA of Nasarawa State to provide additional information on parasites of fishes in Nigerian freshwater bodies.

2. MATERIALS AND METHODS

2.1. Collection of Fish Samples

The Cichlid fish samples used for this study were collected fresh from fishermen at Uke River, Karu Local Government Area, Nasarawa State, Nigeria. The fishes were brought to the laboratory immediately for parasitic examination at the Department of Zoology, Nasarawa State University, Keffi. A total of 112 fishes were collected from July - September 2019 for the study.

2.2. Identification and Measurement of Fish Samples

The fish species used for this study were identified by fishery expert (Banyigyi, A. H., Nasarawa State University, Keffi) and fisheries textbooks of Olaosebinkan and Raji (2004) and Idodo-Umeh (2003). All the Cichlids were sorted in taxonomic categories and each specimen was subjected to laboratory measurement. The total length and standard length of each specimen were with measuring board to the nearest centimetre (cm) while the body weight was measured in gram (g). The sexes of fish were determined by internal examination of the testes and ovaries.

2.3. Examination of Gill Parasites

The gills were cut out and placed into separate Petri dishes and observed with a hand lens for parasites. Parasites were collected and fixed in buffered formalin for further processing and specimen identification (Paperna, 1996).

2.4. Examination of Intestinal Parasites

The fish were dissected to expose the alimentary canal. The alimentary canal was removed and sectioned into various parts which were oesophagus, stomach, intestine and rectum. Each section was placed in petri dishes containing 0.9% normal saline. The emergence of any worm was easily noticed by its wriggling movement in the saline solution under a microscope.

2.5. Sedimentation Method

The content of different portions of the gills and intestine were washed with normal saline solution in a petri-dish to enhance filtration process. The sample were poured into a centrifuge test tube and centrifuged at 100 revolution for 5 minutes and allow to settle at different rates while residues were placed on a clean glass slide and covered with a cover slip then observed under microscope.

2.6. Identification of Fish Parasites

The parasites recovered were mounted on slides, viewed under microscope (Model G300 series) and drawn out for identification according to Ugwuzor (1987).

2.7. Data Analysis

Descriptive method of statistical analysis was used in analysing data and the values obtained were expressed in percentages

3. RESULTS AND DISCUSSION

Out of 112 fish samples examined, 11 (9.82%) were infected with parasites while 101 (90. 18%) were not infected (Table 1). Parasites recovered from the fish sample were nematodes (*Huffmanela spp*), platylhelminthes (*Eustrongylides spp.*) and *Eimeria spp.* (Table 1). The prevalence of fish parasites in relation to species, where 6 (10.52%) samples of *Sarotherodon galilaleus* were infected and 5 (9.43%) *Tilapia zilli* were infected with parasites while *Hemichromis fasciatus* was free of parasites as shown in Table 1. The overall prevalence rate (9.82%) of parasite observed in the current study was low compared to the 16.0%, 48.4% and 60.8% prevalence infection observed by Omoniye and Ojelade (2017), Omoniye and Olofintoye (2001) and Olofintoye (2006) in water reservoir, Abeokuta, Elimi river and Ado Ekiti respectively. In the same vein, the findings of Morenikeji and Adepeju (2009) in Eleyele dam in lbadan, South-west, Nigeria and Onyedineke *et al.* (2010) in river Niger at llushi in Edo State reported similar low prevalence results. Infection incidence therefore, seemed to vary greatly from one locality to the other due to factors of endemicity, availability of intermediate hosts and susceptibility of host to infection. 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. The prevalence rate observed in this study in relation to the species of fish examined shows that the *Sarotherodon spp.* has the highest prevalence of 6 (10.52%) of infection compared with *Tillapia zilli* with an infection rate of 5 (9.43%) and *Hemichromis fasciatus* with 0.00% rate. This is in contrast with the report of Omoniye and Ojelade (2017), who observed a reverse case in their study carried out in Abeokuta with 14.3% in *Sarotherodon* spp. 10.5% in *Tilapia zilli* and 16.7%% in *Hemmichromis fasciatus*.

Table 2 shows the prevalence rate of infection of fish in relation to the sex. There was a total of 40 male examined with 3 (7.5%) infected while a total number of 72 female were examined with 8 (11.1%) showing infection. The prevalence of parasites in relation to the sex of the fishes observed in this study shows a significantly high prevalence in female 8 (11.1%) to the 3 (7.5%) observed in male. The differences in the prevalence of infection between males and females have been observed by previous scientists. Infection was significantly high in females than in males in the study which could be due to the difference of their physiological condition of the females especially gravid ones (Omoniyi and Olofintoye, 2001).

The prevalence of fish parasite in relation to the standard length of the fish sampled from Uke River is shown in Table 3. Fish with the standard length of 14-16 cm shows prevalence rate of 25%, fish with standard

length of 12-12 cm had prevalence rate of 9.1% while fish with standard length of 8-11 cm showed a prevalence rate of 5.1%. The prevalence relation to the standard length of the fish sampled from Uke River, the result shows a prevalence rate of 25% in the standard length of 14-16 measured, 9.1% infection rate in the 12-13 standard length and 5.1% in the standard length of 8-11. The result observed in this study is in agreement with the study of Omoniye and Ojelade (2017). Juveniles' fish were less infected than adult this could be attributed to accumulation of parasites year by year as explained by Nwaba *et al.* (1999). The differences in prevalence of infection between the juveniles and the adults as related to their length and weight might be due to changes in their diet from weeds, seeds, phytoplankton and zooplankton to insect larvae crustaceans and worm in both juveniles and adult respectively

The relative abundance of species of parasite found during the study is shown in Table 4. The *Eimeria spp.* had the highest number of parasites isolated with 9(64.29%) followed by *Huffmanela spp.* with 3(21.43%) parasites and the least was the *Eustrongylides spp*. with 2(14.19%) parasites. The protozoan, *Eimeria spp*. found mainly on the gills accounted for a larger (64.29%) percentage of the total parasites recovered; this might be attributed to the direct life cycles of protozoans or the fact that the gills are in great contact with the external water surrounding as a result of their respiratory activities. Another form of parasite found is the nematodes *Eustrongyloides* spp. with prevalence rate of 2 (14.19%), this parasite was not to be host specific as indicated in Omoniyi and Olofintoye, (2001).

Table 1: Prevalence of fish parasite in relation to species

Species	No. examined	No. infected	Percentage infected (%)
Sarotherodon galilaeus	57	6	10.52
Tilapia zilli	53	5	9.43
Hemichromis fasciatus	2	0	0.00
Total	112	11	9.82

Table 2: Sex and parasites infestation

Sex	No. examined	No. infected	Percentage infected (%)
Male	40	3	7.5
Female	72	8	11.1
Total	112	11	18.6

Table 3: Prevalence of fish parasite in relation to fish standard length

Standard length (cm)	No. examined	No. infected	Percentage infected (%)
8 – 11	59	3	5.1
12 – 13	33	3	9.1
14 - 16	20	5	25.0
Total	112	11	9.82

Table 4: Species of parasite isolated

Parasites species	No. of parasites	Location
Eimeria spp.	9 (64.29%)	Gill
Huffmanela spp.	3 (21.43%)	Intestine
Eustrongylides spp.	2 (14.19%)	Gill

4. CONCLUSION

Gills and the gastrointestinal parasites are among the disease-causing organisms militating against fish production, because they have both direct and indirect effect on the productivity of fish from the wild on

human health. The risks of infection with fish-borne parasites also present a potential threat to the health of human consumption. Some of this can occur in other people and some fish-eating animals if they swallow living larvae by ingesting raw fish or under-cooked meat as in roasted fish.

5. CONFLICT OF INTEREST

There is no conflict of interest associated with this work.

REFERENCES

Auta, J., Onye S. J. and Adakole J. A. (1999). The helimintdh parasites of the gastrointestinal tract of *Synodontis species* in Zaria. *Nigeria Journal of Aquacultural Science*, 2, pp. 47-53.

Bichi, A. H. and Ibrahim, A. A. (2009). A survey of ecto and intestinal parasites of *Tilapia zilli* (Gervais) in Tiga Lake, Kano, Northern Nigeria. *Bayero Joumal of Pure and Applied Science*, 2(1), pp. 79-82.

Biu, A. A. and Nkechi, O. P. (2013). Prevalence of Gastroinsestinal Hciminths of *Tilapia zilli* (Gervais 1 848) in Maiduguri, Nigeria. *Nigerian Journal of Fisheries and Aquaculture,* 1(1), pp. 20-24.

Ekanem, A.P., Eyo V.O. and Sampson A. F. (2011). Parasites of landed fish trom Great Kwa River Calabar, Cross River State, Nigeria. *International Journal of Fisheries and Aquaculture* 3(12), pp. 225-230.

Emere, M.C. (2000). Parasitic infection of the Nile Perch *Lates niloticus* (L) in River Kaduna. *Journal of Aquatic Sciences*, 15, pp. 51-54

Idodo-Umeh, G. (2003). *Freshwater Fishes of Nigeria, Taxonomy, Ecological Notes, Diets and Utilization*. Idodo umeh Pubisher Ltd. Benin, Nigeria. p. 232.

Morenikeji, O. A. and Adepeju, A. I. (2009). Helminths communities in Cichlids in natural and man-made ponds in Sputh-West, Nigeria. *Researcher*, 1(3), pp. 84-92

Nwaba, L. A., Edwin, S.C. and Chukwura, E. I. (1999). Studies on effects of Helminths parasites of Tilapiamonodi (Blache on public Health). *Journal of Science, Engineering and Technology*, 6, pp. 2084-2091.

Olaosebinkan, B. D. and Raji, A. (2003). *Field guide of Nigeria Fresh Water fishes*. (A Revised ed.). Federal College of Fresh water Fisheries Technology, New Bussa, Nigeria.

Olofintoye, L. K. (2006). Parasite fauna in some fresh water fish species in Ekiti State, Nigeria. *Pakistan Journal of Nutrition*, 1(4), pp. 359-362

Olurin, K., James, O., Abimbola, A., Raheem, A., John, A., Kafilat, O. and Oluwatosin, O. (2012). Helminths parasites of *Saratherodon galillaeus* and *Tilapia zilii* (Pisces: Cichlidae) from River Oshum, South-West, Nigeria. *International Journal of Aquatic sciences*. 3(2), pp. 49-55

Omoniye, T. I. and Ojelade, O. C. (2017). Parasites of the Cichlid fishes in water reservoir of Federal university of Agriculture, Abeokuta, Nigeria. *Journal of Agricultural science and Environment*, 17(2), pp. 20 - 27

Omoniyi, T. and Olofintoye, L.K. (2001). A survey of endohelminth parasites of fishes from water reservoir and Elemi-river in Ado- Ekiti, Ekiti State, Nigeria. *Bioscience Research Communications*, 13(1), pp. 87-94.

Oniye, S. J., Adebote, D. A. and Ayande, A. I. (2004). Helminths parasites of *Clarias gariepinus* (Teugels) in Zaria. *Journal of Aquatic Sciences,* 19(21), pp. 17-25.

Onyedineke, N. S., Obi, U., Ofoegbu, P. U. and Ukogo, I. (2010). Helminth parasites of some freshwater fish from River Niger at Ilushi, Edo State, Nigeria. *Journal of American Science*, 6(3), pp. 16-21.

Paperna, I. (1996). Parasite infections and disease of fishes in Africa. An Update. CIFA Technical Paper. 31, pp. 1-220.

Ugwuzor, G. N. (1987). A survey of the helminthic parasites of fish in Imo River, Nigeria. *Journal of Applied fisheries and Hydrobiology*, 2, pp. 25-30.