

A Survey of Gastrointestinal Parasites in *Clarias gariepinus* from Selected Fish Farms in Port Harcourt, Nigeria

LeBari Barine Gboeloh,¹ Kingsley Elele and¹ Lydia Etuk Udofia²

¹Department of Biology, Ignatius Ajuru University of Education

²Department of Zoology and Environmental Biology, University of Calabar

Corresponding Author: LeBari Barine Gboeloh

lgboeloh@yahoo.com

Abstract

The prevalence of gastrointestinal parasites in *Clarias gariepinus* from selected fish farms in Port Harcourt was investigated over a period of ten months (April to December, 2015). The fish specimens were purchased from selected fish farms and taken to the laboratory for identification and parasitological examination. Out of the 503 *Clarias gariepinus* investigated, 181 (35.9%) were positive for the parasites. Cestodes, trematodes and nematodes represented 54.4% (103/197), 6.7% (13/197) and 42.0% (81/197) of the total parasites recovered. There was no significance difference ($p>0.05$) in prevalence between male and female and the length group of 10.0-15.0cm were significantly ($p<0.05$) infected than other length group. The parasites were found in the stomach 49(24.9%), intestine 148 (75.1%) and no parasite was recovered from the gill. The results recorded in this study indicated that cultured *C. gariepinus* like the ones in the wide are not free from gastrointestinal parasites.

Key Words- *Clarias gariepinus*, Gastrointestinal, Parasites, Fish farm, Port-Harcourt.

1. Introduction

Fish is one of the major sources of protein in Nigeria. Until recently, the major sources of fish in Nigeria were streams, rivers and importation. Although the first attempt to practice fish farming started with catfish in Onikan, Lagos in 1951 [1], catfish farming was not commercially viable until the period between 1991 and 2001 [2].

Reports indicated that the most aquacultured catfish in Nigeria are *Clarias gariepinus*, *Heterobranchus bidarsalis*, *Clarias nigroditatus* and the hybrid *Heteroclarias* [3]. *Clarias gariepinus* is found in swamps, lakes, streams and rivers in Niger Delta and it is consumed either as fresh or smoke (dried) fish. The fish is generally regarded as predators or omnivores, feeding on plant debris, aquatic and terrestrial insects, molluscs and fruits [4, 5, 6].

Currently in Nigeria, fish farming (aquaculture) has not only become a major source of fish production but also a significant source of employment and income generation. For instance, [2] reported that in 2012, about 253, 898 persons were employed in the sub-sector and an average of 253,898 metric tonnes of catfish was produced. This, according to [2] translated to about \$846, 326, 667 besides the \$432, 163, 334 from fish related business in eateries and restaurants.

Many studies conducted in Nigeria indicated that catfish have high burden of gastrointestinal parasites [7, 8, 9, 10]. [11] also recorded that different species of adult helminth parasites are found in African fresh water fishes and these parasites have varying degree of pathology on the fish [12]. For instance, high worm burden especially helminth parasites are known to affect the gonads and eyes of fish leading to sterility and blindness respectively [13, 14]. [15] equally

reported that these parasites affect the normal physiology of fish and if not treated and controlled, could cause severe mortality of infected fishes. Consumption of these infected fish by other vertebrates including man may cause disease [16].

In view of the importance of catfish to food production and the increasing interest in aquaculture sub-sector in Nigeria, it is necessary to investigate the prevalence of gastrointestinal parasites in catfish (*Clarias gariepinus*) in selected fish ponds in Port Harcourt, South-South Nigeria.

2. Materials and Methods

2.1 Study Area. The study was conducted using selected fish farms within Port Harcourt Metropolis (Fig. 1.0). The city covers two local government areas (Port Harcourt City and Obio/Akpor Local Government Areas). It lies along the Bonny River in the Niger Delta, South-South of Nigeria. It is between latitude $4^{\circ}41^1$ and latitude $7^{\circ}10^1$ to longitude $7^{\circ}55^0$ east of Greenwich meridian [17] with an estimated population of 1,947,000 as at 2012[18]. The city has the features of tropical monsoon climate with distinct long rainy season and short dry season. The dry season last for five months(November, December, January, February and March) while the rainy season last for seven months(April, May, June, July, August, September and October). However, there is rarely any month of the year without rainfall [19].

It has high temperature (about 30° or 86°F), low pressure and high relative humidity (between 80% and 100%) all year round and a mean annual rainfall of 2,300mm [20].



Fig.1: Map showing Port Harcourt Metropolis

2.2 Collection of Specimens. Five fish farms within Port Harcourt Metropolis were randomly selected for this study. The fish farms included New Life Fish farm, Majapac Crown Splendor fish farm, Felaso fish farm, Ella Lakes fish farm and fish farm at Africa Regional Aquaculture centre. The fish farms were designated A, B, C, D and E respectively. All the ponds from which the fishes were collected were earth-ponds. The fishes were purchased from the farms and kept alive in well labeled buckets and transported to the research laboratory, Department of Biology, Ignatius Ajuru University of Education for identification using the key of [21, 22] and laboratory examination of the parasites. The research was conducted within April and December, 2015.

2.3 Laboratory Examination for Parasites. The fishes were grouped according to their length (centimeter), sex and source (farm) and the data properly recorded. Accordingly, the fishes were classified into the following groups:

Group 1: 10.0- 15.0cm

Group 2: 15.1- 20.0cm

Group 3: 20.1-25.0cm

Group 4: 26.1- 30.0cm

Each of the fishes was dissected on the ventral side from the anal opening to the anterior in order to expose the digestive tracts. The digestives tracts were removed and placed in well labeled specimen bottles containing 0.09% normal saline to recover the parasites. The gills were also removed and placed in similar containers. The samples were examined by visual examination using hand lens when necessary. The normal saline caused the wriggling movement of worms which were quickly recovered and counted.

The parasites were stained for identification using the method of [10]. The parasites were stained for 5 to 10minutes in petri dishes containing acetocarmine before washing in 70% alcohol. And later, dehydrated in absolute alcohol and cleared in xylene, then mounted in Canada balsam. The parasites were observed under the microscope for identification using the keys by [12].

3. Results

A total of 503 *Clarias gariepinus* from five fish farms in Port Harcourt Metropolis were investigated for the presence of gastrointestinal parasites. Out of the 503fish examined, an overall prevalence of 181(35.9%) was recorded (Table 1). Although there was no statistically significant difference ($P>0.05$) in prevalence among fish from the various fish farm, catfish obtained from New Life fish farm had the highest percentage of 42(23.2%) while Ella lake fish farm had the least percentage 30(16.6%).

Table 2 indicated that in spite of the infection of more females 93(51.4%) than males 88(48.6%), there was no statistically significance difference ($p>0.05$) between sexes. Some of the infected fishes have double infection and a total of 197 adult worms were found in fishes investigated, out of which 103 (53.4%), 13(6.7%) and 81 (42.0%) were cestodes, trematodes and nematodes respectively (Table 3).

Table 4 indicated that catfish within the length of 10.0-15.0cm haboured more worms 70(38.6%) while those within the length of 20.1-25.0 had lesser worm burden 22(12.2%). The intestine was the most infected 148(75.1%) of all the organs investigated, followed by the stomach with 49(24.9%). No parasite was found in the gill (Table 5).

Table 1: Prevalence of gastrointestinal parasites of *Clarias gariepinus*

Fish Farm	No. Examined	No. infected (%)
A	104	42(23.2)
B	101	32(17.7)
C	95	38(21.0)
D	92	30(16.6)
E	111	39(21.5)
	503	181(35.9)

A=New Life Fish Farm, B= Majapac Crown Splendor Fish Farm C= Felaso Fish Farm D= Ella Lakes Fish Farm E=Africa Regional Aquaculture Centre fish farm

Table 2: Prevalence of gastrointestinal parasites of *Clarias gariepinus* in relation to sex

Sex	No. Examined	No. Infected (%)
Male	262	93(51.4)
Female	241	88(48.6)
	503	181(35.9)

Table 3: Prevalence of gastrointestinal parasites of *Clarias gariepinus* in relation to taxa of parasites.

No. Positive	Gastrointestinal Parasites		
	Cestoda (%)	Trematoda(%)	Nematoda(%)
181	103(53.4)	13(6.7)	81(42.0)

Table 4: Prevalence of gastrointestinal parasites of *Clarias gariepinus* in relation to length

Fish Length (cm)	No. Examined	No. Infected (%)
10.0-15.0	202	70(38.6)
15.1-20.0	101	47(26.0)
20.1-25.0	99	22(12.2)
25.1- 30.0	101	42(23.2)
	503	181(35.9)

Table 5: Prevalence of gastrointestinal parasites of *Clarias gariepinus* in relation to site of infestation

Parasite taxa	Site of infestation			
	Stomach	Intestine	Gill	Total
Cestoda	25	78	0	103
Trematoda	0	13	0	13

Nematoda	24	57	0	81
	49 (24.9)	148(75.1)	0(0)	197(100)

4. Discussion

This study examined the gastrointestinal parasite burden of *C. gariepinus* in five fish farms in Port Harcourt, Nigeria. Several studies have been conducted in Nigeria to determine the prevalence of gastrointestinal helminthes in catfish in the wild [6, 10, 8, 23, 24]. However, very little has been done, if any, to investigate the prevalence of these parasites in cultured catfish. In this study, an overall prevalence of 35.9% was recorded. This result is lower than the 43.64% recorded by [8] in *C. gariepinus* in GwaGwalada, Nigeria, the 69.7% recorded by [23] in same species in Lekki lagoon, Nigeria, the 76.04% recorded by [14] in catfish in lake Hawassa, Ethiopia, 75% prevalence recorded by [10] in catfish from Ogun River, South West Nigeria, the 63.0% recorded by [25] in some wild freshwater *C. gariepinus* and 59.8% in cultured *C. gariepinus* from Jos Plateau, Nigeria. A high prevalence of 68.57% was also recorded by [23] in another species (*Synodontis clarias*) from Lekki lagoon, Nigeria.

The result of 35.9% recorded in this study is in range with the 34.7% reported by [26] in *C. gariepinus* in Plateau state, Nigeria but higher than the 25.9% recorded by [10] in *C. gariepinus* in Asejire Dam, Nigeria, the 4.72% recorded by [6] in Lekki Lagoon, Nigeria and the 19.17% reported by [7] in *C. gariepinus* in Zaria, Nigeria.

The differences in prevalence in different study areas could be attributed to the effects of the interplay between biotic and abiotic factors on parasitic relationships among organisms in an ecosystem [27]. It could also be attributed to the geographical position of the various study areas [6].

According to [14, 28], the physical and chemical conditions of the ponds investigated and the availability of the intermediate host in the ponds may account for the high prevalence rate of 35.9% recorded in this study. The recorded result may also be due to the organic content of the ponds [10], nature of diet of the fish [25] as *C. gariepinus* is reportedly an omnivorous feeder [9] and overcrowding which facilitates transmission of parasites [7, 26].

Although Table 2 indicated that more females were infected 93(51.4%) than males 88(48.6%), there was no significant difference ($p > 0.05$) in prevalence between the sexes, an indicator that both sexes are vulnerable to infection by the parasites, and that the parasites have no preference for any sex. This result conforms to the records of [7, 10, 23, 14]. However, the result is contrary to the observation made by [29] in *Synodontis clarias* in Lekki lagoon, Lagos.

Table 3 showed that cestodes were the significantly ($p < 0.05$) abundant species of helminthes 103(53.4%) recovered from *C. gariepinus*, followed by nematodes 81(42.0%) and trematodes 13(6.7%). This result is in agreement with records of [7, 8, 14, 10, 25, 30].

There was a statistically significant difference ($p < 0.05$) in prevalence among the various length groups investigated (Table 4). The length range of 10.0-15.0cm have the highest worm burden (38.6%) followed by the length range of 15.1-20.0cm with 26.0%. Similar result was recorded by [23]. The researchers recorded a high prevalence of 83.33% and 62.9% in length groups of 11-13.9cm and 14-16.9cm respectively.

Again, [10] recorded that shortest catfishes in Asejire dam and Ogun river have more worm burden than longest fishes. [29] also reported that *Synodontis clarias* of the length range of 10-15cm and 16-20cm recorded high prevalence rates of 42.1% and 36.6% respectively. [6] equally recorded gastrointestinal parasitic prevalence of 4.16% and 3.92% in *C. gariepinus* of length range of 10-15cm and 21-25cm respectively. A condition the researchers attributed to differences

in feeding habit, age and immunity level of different length groups. According to [8, 26, 30], high infection rate in sub-adult of middle length may be as a result of change in diet from weeds and planktons to insects and other intermediate host of these parasites.

Table 5 indicated that the intestinal track was the most predilection site of 75.1% of the parasites. This is followed by the stomach (24.9%). Similar result was recorded by [7]. The preference for the intestine could be attributed to the fact that 53.4% of the total parasites in the investigated sample was cestodes, and cestodes are characterized by lack of functional digestive system, hence they depend on already digestive food substances in the intestine of the host. Therefore, they are naturally found in the intestine where their nutritional needs will be satisfied [7].

5. Conclusion

The results recorded in this study indicated that cultured *C. gariepinus* like the ones in the wide is not free from gastrointestinal parasites. Considering fish farming as an emerging and important source of fish production employment, attention should be focus on the control of these parasites.

Acknowledgement

The authors are grateful to the laboratory technologist in the research laboratory, Ignatius Ajuru University of Education, Port Harcourt.

Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

References

- A.A. Adewumi and V.F. Olaleye, "Catfish culture in Nigeria: Progress, Prospects and Problems". African Journal of Agricultural Research, Vol. 6 no. 6, pp 1281-1285, 2011.
- A.A. Hassan, B. Akinsanya and W.A.Adegbaju, "Impacts of Helminth parasites on *Clarias gariepinus* and *Synodontis Clarias* from Lekki lagoon, Lagos, Nigeria" Report and Opinion, Vol. 2, no . 11, 2010.
- A. Hussien, M. Tefera and S. Asrate, "Gastrointestinal helminth parasites of *Clarias gariepinus* (catfish) in lake hawassa", Ethiopia . Scientific Journal of Animal Sciences, Vol.1, no. 4, pp. 131-136, 2012.
- A.R. Longhurt, Report on the fisheries of Nigeria. Federal Fisheries Services. Ministry of economic development, Lagos, 1961. IIARD International Journal Of Biology And Medical Research Vol. 2 No.2 2016 www.iiardonline.org IIARD – International Institute of Academic Research and Development Page 7
- B. Akinsanya, A.A. Hassan and O.A. Otubanjo, "A comparative study of the parasitic helminth fauna of *Gymnarchus niloticus* (Gymnarchidae) and *heterotis nilotis* (Osteoglossidae) from Lekki Lagoon, Lagos, Nigeria". Pakistan Journal of Biological Sciences, Vol. 10, no. 3, pp.427-432.
- B. Akinsanya, A.A. Hassan and A.O. Adeogun, " Gastrointestinal Helminth Parasites of Fish *Synodontis Clarias* (Siluriformes : Mochokidae) from Lekki lagoon, Lagos, Nigeria". International Journal of Tropical Biology, Vol.56, no.44, pp. 2021-2026, 2008.
- B. Akinsanya and O.A. Otubanjo, "Helminth Parasites of *Clarias gariepinus* (Clariidae) in Lekki Lagoon, Lagos, Nigeria". International Journal of Tropical Biology, Vol. 54, no. 1, pp. 93-99, 2005.

- B.D. Olaosebikan and A. Raji, Field Guide to Nigerian Freshwater Fishes. Federal College of Freshwater Fisheries Technology, New Bursa, Nigeria, 1998.
- C.O.E. Onwuliri and M.O. Mgbemene, “ The parasitic fauna of some freshwater fish from Jos Plateau, Nigeria”. Journal of Applied Fisheries and Hydrobiology, Vol. 2, pp. 33-37.
- D.S. Admed, A. Oboh and U.B Ibrahim, “The prevalence of helminth parasites in the gastro intestinal track of wide African sharpthorh catfish *Clarias gariepinus* (Siluriformes: Clariidae) in Gwagwalada” . Nigeria. Cuadernos de investigacion, Vol. 5, no. 7, pp. 1659-4266, 2013.
- E. Aston-Jones, Human Ecology of the Niger Delta. ERA Handbook, Benin City, Nigeria, 1998.
- E.A. Ogbeibu, C.E. Okaka and B.J.Oribhabor, “Gastrointestinal helminth parasites community of fish species in a Niger Delta tidal creek, Nigeria”. Journal of Ecosystem, Vol. 2014.
- H, Williams and A. Jones, Parasitic worms of fish. Taylor and Francis, Bristol, UK, pp. 593.
- I. Paperna, Parasitic, Infections and Disease of Fishes in Africa-An update. CIFA Technical Paper 31, FAO, Rome, pp.1-220, 1996
- I. Paperna, Parasitic, Infections and Disease of Fishes in Africa-An update. CIFA Technical Paper 7, FAO, Rome, pp.200, 1980.
- J.C. Anosike, E. Omoregie, P.C Ofojekwu and I.E. Nweke, “A survey of helminth parasites of *Clarias gariepinus* in Plateau state, Nigeria”. Journal of Aquatic Sciences, Vol.7, pp. 39-43, 1992.
- J.C. Micha, “Etude des populations piscicoles de l’ubangui et tentative de selection et d’ adaptation de queles especes a l’ etang de pisciculture”. Centre technique Forestiere Tropical, Nogent sur Marne, pp.100, 1973.
- L.F Khalil and L. polling, Check list of the helminthes parasites of African fresh water fishes. University of African Republic of South Africa, pp. 161, 1997.
- M.A. Anetekhai, Catfish aquacultural industry assessment in Nigeria . Inter-Africa Bureu for animal resources, African Union, pp.1.
- M. Archibong, Port Harcourt: Garden City with few flowers, The Daily Sun, Sun Publishing Limited, 2004. IIARD International Journal Of Biology And Medical Research Vol. 2 No.2 2016 www.iiardonline.org IIARD – International Institute of Academic Research and Development Page 8
- M.O. Sosanya, Fish parasite as indicators of environmental quality. M.Sc Thesis, University of Ibadan, 2002, pp.142.
- M.T. Salawu, O.A. Morenikeji, A.A.Sowunmi, and A.B. Odaibo, “Comparative survey of helminth parasites of *Clarias gariepinus* (Burshell, 18822) and *Clarias pachynema* (Boulenger, 1903) from the Ogun River and Asejire Dam in South-west Nigeria”. International Journal of Fisheries and Aquaculture, Vol. 5, no. 1, pp. 7-11,2013.
- N.N. Bruton, “The food and feeding behavior of *C.gariepinus* (Pisces, claridae) in Lake Sibaya,

- South Africa, with its emphasis on its role as a predator of cochleas”. Zoology Society of London, Vol. 35, pp.47-114.
- O. Akpoghomeh, Street map of Port Harcourt metropolis and its environs. Kraft Books, Ibandan, 2001.
- O.A.M. Fagbenro, C.O. Adedire, E.A. Owoseeni and E.O. Ayotunde, “Studies on the biology and aquaculture potential of feral catfish *Heterobranchus bidosalis*”. Tropical Zoology, Vol.16, pp. 67-79.
- P.C. Mmom, The Niger Delta: A spatial perspective to its development. Zelon Enterprises, Port Harcourt, 2003.
- S. Kabata, Parasites and diseases of fish cultured in the tropics. London: Taylor and Francis, pp. 318, 1985.
- S.J. Oniye, D.A. Adebote and O.I. Ayanda, “ helminth parasites of *Clarias gariepinus*(Teugels) in Zaria, Nigeria” . Journal of Aquatic Science, Vol. 19, no. 2, pp. 71-75. 2004.
- W. Reed, J. Burchard and A.J. Hopson, Fish and fisheries of Northern Nigeria. Ministry of Agriculture, Kaduna Government Printer, Northern Nigeria, 1967.
- W. Schneider, FAO Species Identification Sheets for Fishery Purposes. A Field Guide to the Commercial Marine Resources of the Gulf of Guinea. Food and Agricultural Organisation of the United Nations, Rome, Italy, 1990.