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Prevalence of Gastrointestinal Helminthes in *Clarias gariepinus* and its Fishing Practices at River Rima, Sokoto Nigeria

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ABSTRACT

This study was conducted to evaluate the prevalence of gastrointestinal helminthes and fishing practices of Clarias gariepinus in River Rima, Sokoto. Samples were collected and examined weekly for 10 weeks (August to October, 2015) at Kwalkawalawa landing site along River Rima, Sokoto. Results indicates that 8.33% were infected with 2 Nematode (Procamallanus laeviconchus and Paracamallanus cyathopharynx), 1 Cestode (Monobothrium wageneri) and 1 Acanthocephalan (Neochinorhlynchus rutilli). Nematode had highest prevalence with 54.5%, while Acanthocephalan has the lowest prevalence of 9.1%. It was also observed that stomach had highest prevalence of parasitic infection of 63.6%, followed by intestine with 36.4%. The survey of fishing practices also revealed that despite the awareness of fish depletion among the fishermen, only 93% of the respondents were aware of its consequences. For the regularity of fishing 93.3% of the fishermen fish for more than 5 days in a week. On the size of fish caught 100% of the respondent have choice for the size of fish but 30% of the respondent caught fingerlings, 36.7% caught juvenile while 33.3% of the fishermen caught adult fish. On the species of fish caught, 96.7% of the respondent had choice for specific species despite that the genus Clarias gariepinus being mostly caught (100%). Fishing gear used varied among the fishermen, in which 20% used net, 16.7% used hook, while 63.3% used any fishing gear available to them. It was also observed that the Clarias gariepinus was over-exploited at River Rima which may lead to its depletion.

Key words: *Clarias gariepinus, Fishing, Respondents, Sokoto, Rima*

INTRODUCTION

Various studies have been conducted on intestinal helminth of fish including *Clarias gariepinus*, the family claridae is considered to be one of the most important tropical catfishes for aquaculture in West Africa. It is very common in swamps lakes and rivers throughout Africa and it is the main fish fisherman catches[1]. *Clarias gariepinus* has been considered to hold great promise in fish farming in Africa, for fish having a wide geographical spread, a high growth rate, resistant to handling stress and well appreciated[2] It is highly priced and requested for, by fish farmers and consumers in Nigeria in either as smoked or fresh[1].

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Various parasites are associated with *Clarias gariepinus* in the wild and cultured environment where they cause mobility, mortality and economic losses in aquaculture practices in the world[3].

Fishing is a human tradition, a traditional activity that involves hunting and gathering of aquatic fauna for food[4]. Nigerian fisheries can be broadly classified into: Artisanal fisheries (85%), industrial fisheries (14%), and culture fisheries (1%) according to federal Department of Fisheries[5]. A survey on fishing practice comprises of investigation on different aspect of fishing which includes fishing frequency, size species of fish caught, type of fishing gear used in fishing, purpose for fishing, fish exploitation and species of fish preferred to catch[4]. Over-exploitation, overfishing or fish depletion is another problem militating against fishery, apart from parasitic infection. Overfishing does not only reduce the source of food today but also can lead to other negative impact on aquatic ecosystem which supply for future generation. The scope of human dependence on aquatic life is significant. Both in term of nutritional value provided by fish and other seafood to population (especially in the developing world) and in term of the level of economic security the fishing industry provided for coastal communities[6]. Indeed many experts agree that the exploitation limit of aquatic resources has been reached, if not exceeded, generally poor management of most fisheries are to blame[7]. Fish has a remarkable impact on lives of many individuals and communities in almost all continents of the world[8]. Fish is primarily major source of relatively cheap and affordable essential animal protein[8]. Fish interact with the various levels of food chain and influence the structure of lakes, streams and estuaries, since they are usually restricted to particular requirement[9]. Fishing and fish processing provide job opportunities and source of income for individuals and groups of people[8].

Fish parasitism constitutes a major threat to fish productivity both in aquaculture and inland water[10]. Most of the previous studies in Nigeria on fish parasite has been on freshwater fish species[11]. Some of these previous researches on freshwater fishes parasitism include;[1,8,9,12] ,[13,14,15,16]. While other scientists such as Akinsanya[2] carried out research on fish parasite of Lagos Lekki Lagoon, typical brackish water, while[17] carried out their research on general fish parasites. Other researchers of fresh and marine fish parasite include; Ko[18] and Awharitoma[11]. However, there is paucity of information on helminths of *Clarias* in Sokoto; hence this study was conducted to determine the prevalence of gastrointestinal parasites of *Clarias gariepinus* and survey fishing practices of *Clarias gariepinus* in River Rima, Sokoto.

MATERIALS AND METHODS

Study Area

The sampling was carried out along River Rima at Kwalkwalawa landing site, Sokoto State, Nigeria. The State is located in the extreme Northwestern Nigeria between longitudes 4^0E and 6^0 54'E and latitude $12^0$0' and 13^0 54'N.[19] The study area is within Sudan Savannah zone. Rainy season is usually between May/June to early October/November, when the natural water bodies are often flooded[20]. River Rima is the most important perennial river network in Sokoto. Its major tributaries are River Bunsuru and Gagare. The river takes its course from Katsina State flows through Zamfara State and in Sokoto State joins River Sokoto, before flowing to River Niger in Kebbi State[21].

Sample Collection

Clarias gariepinus was purchased randomly from different fishermen at the landing site weekly, from August–October 2015. Thus, thirty (30) *Clarias gariepinus* individuals were randomly purchased for ten weeks at Kwalkwalawa fishery (landing site) along River Rima Sokoto. The fish was transported in a plastic container from the landing site to the parasitology laboratory, Department of Biological Sciences of Usmanu Danfodiyo University, Sokoto.

Identification and Measurement of Length (cm) and Weight (g) of the Fish

Identification of fish was carried out according to Williams[22] and Olaosebikan[23] at Department of Fishery of Faculty of Agriculture of Usmanu Danfodiyo University, Sokoto. The weight of each fish was measured to the nearest 0.1 gram on a top loading weighing balance. The standard length (from the tip of the snout to the end of the base of caudal pendicule) and the total length (from the tip of the snout to the extreme end of caudal fin) were measured using a meter rule mounted on the dissecting board[24]. Grip length was measured by rapping the thread around the biggest part of the body and thread was *measured* on the meter rule.

Examination of the Parasite

This was done according to Salawu[25], the gastrointestinal tract of individual fish was dissected from the rectum to the oesophagus and all helminths seen were carefully detached, processed using standard parasitological methods as described by Olurin[26], and identified based on their morphological features as described by Zdensk[27] and Kabata[28].

Survey of Fishing Practices

A semi-structured questionnaire was distributed to respondents (fishermen) at Kwalkwalawa landing site of River Rima with full interpretation to fisherman in mother tongue language since virtually all did not understand English language.

Data Analysis

Data obtained both at field and laboratory was subjected to statistical analysis, the overall prevalence of the parasitic infection was expressed in percentage.

RESULTS AND DISCUSSION

Prevalence of Helminths

The present study shows that *Clarias gariepinus* has low overall parasitic infection. The infection rate evaluated in this study was lower compared to 38.0% infection rate reported in Maiduguri, Nigeria by Biu[24], 19.17% reported in Zaria Oniye[29] and 16.6% reported from Asa River in Ilorin and its impoundment[1]. Williams[30] suggested that parasitism varies from one aquatic ecosystem to other and this is influenced by the interplay of mixed biotic and abiotic factors.

The *Monobothrium species* of Cestode that was both found in the stomach and intestine was similar to the finding of Oniye[29] where they argue that *Monobothrium* may have been hatched from intermediate host that probably were active in the intestine while micro-habitat was condusive. This implicated intermediate host which include; Cyclops insects and other aquatic arthropods[30].

Prevalence of helminths was higher in the stomach than in the intestine (Table 2), this was in contrast to the findings of Bichi[31] and that of the Ajala[32]. This may be due to regional localisation in the gut that can be attributed to food reserve. Ajala[32] also proved that helminths differ in their nutritional and respiratory requirements which may influence their choice of habitat. The Acanthocephalan, *N rutilli* was found in the intestine of the fish and its prevalence was low, this is similar to the finding of Ajala[32]. Being not present in the stomach can signify the possibility of its not being able to survive in an acidic medium. Olofintoye[33] and Ayanda[1] also reported very low prevalence of the worms in the intestine of its host. It was also observed in this study that percentage infection increased with increase in weight of the fish (Table 3). Similarly, observations were reported by Ayanda[1], Biu[24] also observed such, they argue that bigger fish has larger surface area, and therefore more susceptible to parasitic infection. The low overall infection rate reported may be due to fact that infection rate varies greatly from one area to another. Even though *Procamallanus laeviconchus* (Nematode) recorded highest infection of 36.4% among the species identified (Table 4). This may be attributed to factors such as availability of intermediate host, susceptibility of definite host among others[24].

Table 1: Weekly Prevalence of Helminthes in *Clarias gariepinus* of River Rima

Weeks	Nematodes	Cestodes	Acanthocephalan	Total
1	0	0	0	0
2	2	1	0	3
3	2	2	0	4
4	0	0	0	0
5	1	0	0	1
6	1	1	1	3
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
Total	6 (54.5%)	4 (36.4%)	1 (9.1%)	11 (100%)

Table 2: Prevalence of Helminthes in *Clarias gariepinus* in Gastrointestinal Parts

Gastrointestinal Part	Nematode	Cestodes	Acanthocephalan	Total	(%)
Oesophagus	0	0	0	0	0
Stomach	4	3	0	7	63.6
Intestine	2	1	1	4	36.4

Table 3: Prevalence of Helminthes in *Clarias gariepinus* Base on Weight and Total length

Weight (g)	Nematodes	Cestodes	Acanthocephalan	Total	Percentage
60-80.9	1	0	0	1	9.1
81-100.9	0	0	0	0	0
101-120.9	0	0	0	0	0
121-140.9	5	4	1	10	90.9
Total Length (cm)					
14-21.9	1	0	0	1	9.1
22-29.9	1	2	0	3	27.3
30-37.9	4	2	1	7	63.6

Table 4: Prevalence of Helminthes in *Clarias gariepinus* Species Specific and Number of Fish Infected

Species Identified	Taxonomic Grp.	NO. P	NO. E	(%) of Infection
Procamallanus laeviconchus	Nematodes	4	30	36.4
Paracamallanus cyathopharynx	Nematodes	2	30	18.2
Monobothrium wageneri	Cestodes	4	30	27.3
Neochinorhlynchus rutilli	Acanthocephalan	1	30	9.1

Footnote: Grp- Group, NO. P- Number of parasite identified, NO.E- Number of Fish examined

Survey of Fishing Practices

On fishing practices, result obtained from respondent shows a great development in awareness of fish depletion and its consequence among the fishermen at River Rima compared to survey of. [4] This research recorded 100% awareness compared to[4] that recorded 100% of unawareness. The survey also found that 100% fishermen had choice for a specific species of fish, this is in contrast to findings of [4] where 50% of the fishermen at River Rima had no choice for a specific species. There were different practices among the fishermen at River Rima, 70% of the fishermen used net, 16.7% used hook, while 63.3% used any fishing gear. This is similar to the findings of [4] where 60% of the fishermen at River Rima used and fishing gear. The size of fish caught also varied from 30% fingerlings, 36.7% juveniles, and 33.3% adult. On basis of fishing frequency, most of the fishermen (93.3%) fish more than five days in a week (virtually every day) Table 5. This is also similar to findings of[4] where they recorded that most of the respondents fish every day. Result of this study proved that most of the fishermen fish more than 5 days in a week and also fish indiscriminately. It was also observed that it was *Clarias gariepinus* that they all catch most. These may all be interpreted that *Clarias gariepinus* is highly exploited in River Rima and it can lead to depletion.

Table 5: Fishing Practices of *Clarias gariepinus* in River Rima, Sokoto

Options	Frequency	Percentage (%)
Frequency of Fishing		
2 days	1	3.30
5 days	1	3.30
More than 5 days	28	93.4
Total	30	
Preferred Fish Species		
Yes	29	96.7
No	1	3.3
Total	30	100
Species Caught		
Clarias gariepinus	30	100
Fish Size Caught		
Fingerlings	9	30
Juveniles	11	36.7
Adult	10	33.3
Total	30	
Awareness of Fish Depletion		
Yes	30	100
Consequences of Fish Depletion		
Yes	28	93.3
No	2	6.7
Total	30	

CONCLUSION

Clarias gariepinus is one of the most resistant, widely accepted and highly valued fishes that is being caught regularly in River Rima and there were only 4 groups of gastrointestinal parasitic helminthes present in the River. Thus, this research shows that *Clarias garipinus* has low gastrointestinal helminthes infection rate. Though only the following species were identified; *Procamallanus laeviconchus, Paracamallanus cyathopharynx, Monobothrium wageneri, Neochinorhlynchus rutilli*. It was also observed that *Clarias gariepinus* was over fished and the fishermen are aware of depletion.

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