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Department of Fisheries, Faculty of Agriculture, University of Maiduguri, Nigeria
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Prevalence of Endoparasites of *Clarias gariepinus* (Burchell 1822) in Maiduguri, Nigeria

*Biu, A. A. and Akorede G. J.
Department of Veterinary Microbiology & Parasitology
Faculty of Veterinary Medicine P.O. Box 8136, University of Maiduguri, Maiduguri, Nigeria

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ABSTRACT

A prevalence study on the endoparasites of Clarias gariepinus using standard parasitological methods was conducted in Maiduguri, from January to May, 2012. A total of 100 Clarias gariepinus were examined for endoparasites. Of the total number examined, 38(38.00%) were infected with parasites, which included nematodes, cestodes and protozoa. The Cestode diphyllobothrium latum was identified with a prevalence of 31.60%, Gnathostoma spinigerum a nematode had a prevalence of 44.70% while the blood protozoa Trypanosoma spp had a prevalence of 23.70%. There was a significant difference ($p \leq 0.05$) between prevalence of infection and standard length and body weight of Clarias spp., whereas there was no significant difference ($p \geq 0.05$) between the sexes of the fishes.

Keywords: Prevalence, Endoparasites, *Clarias gariepinus*, Nigeria

INTRODUCTION

Fish is amongst the important sources of protein for humans and other animals in the tropics. According to FAO (1989), fish accounts for more than 40% of the protein diet of two-thirds of the global population. Fish not only provides food for immediate consumption but people rely on fishing for economic gains and providing jobs. A well-processed fish product from the tropics has a ready market in developed countries and is therefore a good foreign earner (Imam and Dewu, 2010).

Nigeria is among the largest fish consumers in the world with over 1.5million tonnes of fish consumed annually (Imam and Dewu, 2010). Yet, today, Nigeria has a big fish requirement deficit as the country imports over 900,000 metric tonnes of fish while its domestic fish production is estimated at 450,000 metric tonnes/years. This large dependence on imported fish has adversely affected her economy and mostly foreign reserves (Imam and Dewu, 2010). Like other animals, fish is also afflicted by endo and ectoparasites, especially protozoans and helminths causing heavy mortality (Al-Murjan and Abdullahi, 2008).

Parasitic diseases of fish are of particular importance in the tropics. Parasites usually exist in equilibrium with their host as a survival strategy. However, in instances where hosts are overcrowded such as in aquaria or in fish farms, parasitic diseases can spread very rapidly causing high mortality. Although, this is usually not the case in the wild natural aquatic environments, it occurs when the

*Corresponding Author: E-mail: biuvet@yahoo.com, Tel: +234(0) 8023860852

environment is disturbed by human activity and interference especially with populations which alter the natural distribution of their parasite communities (Imam and Dewu, 2010).

Ayanda (2009) reported *Amonotaenia* and *Polyonchobothrium* species of Cestodes; *Procamallanus* and *Paracamallanus* species of nematodes and *Neoechinorhynchus* species of acanthocephalans in wild and cultured *Clarias gariepinus* in Ilorin, North central Nigeria; while Hussein *et al.* (2012) reported *Capillaria*, *Contracaecum* and Cestodes in *Clarias gariepinus* caught from Lake Hawassa, Ethiopia.

As yet no epidemics of endoparasites have been reported in Nigeria, is likely that as fish culture becomes more intensive and widespread, fish parasites are likely to become a serious economic and health issues (Imam and Dewu, 2010). As a result of this, there is need for the study of fish parasites with the aim of controlling them. This study therefore was designed to determine the prevalence of parasites in feral *Clarias* fish stock in Maiduguri, Nigeria.

MATERIALS AND METHODS

Study area

This study was conducted in Maiduguri, in Borno State. It lies within the semi-arid zone of North eastern Nigeria with low rainfall (600mm) between late June and early October, followed by a prolonged dry season for the rest of the year (Hess *et al.*, 1995).

Sample collection

Clarias (56 males and 44 females) species were purchased alive from local fish sellers at various fish markets within Maiduguri Metropolis between January and May 2012. The fish samples were transported in a plastic bucket containing clean tap water to the Parasitology laboratory of the Faculty of Veterinary Medicine, University of Maiduguri where they were examined for endoparasites. In the laboratory, the fishes were sorted out and identified using keys (Holden and Reed, 1972). The fish were sacrificed using the mechanical stunning method. The standard length (from the tip of the snout to the end of the base of caudal peduncle) and the total length (from the tip of the snout to the extreme end of the caudal fin) were measured using a half meter rule mounted on a dissecting board (Lowe McConnell, 1972).

The weight of each fish was measured to the nearest 0.1g on a top loading Mettler balance. The sexes of the fish were determined only after dissecting the fishes and noting the presence of testes or ovaries (Imam and Dewu, 2010).

The gastrointestinal tract of individual fish was cut open from the rectum to the oesophagus and examined for endoparasites using standard parasitological methods as described by Paperna, (1996). Thus parasites obtained were counted and placed in physiological saline overnight in a refrigerator to enable them stretch and relax, and later fixed in 5% formalin. They were stained overnight with Ehrlich's haematoxylin solution and passed through graduated alcohol levels (30, 50, 70, 90 % and absolute) for 45 minutes to dehydrate, cleared in xylene and mounted on a glass slide in Canada balsam for examination and identification under the light microscope at x10. Nematodes were cleared in lactophenol, and examined under the light microscope at x10 and x40 magnification.

Blood samples obtained from the dorsal aorta using a collar needle were prepared as thin and thick impression smears and examined for blood parasites as described by Paperna (1996), by fixing in absolute methanol for 5 minutes and stained with Giemsa, and examined under oil immersion using light microscope at x100 for haemoparasites.

Statistical analysis

The Student's t-test was used to compare prevalence rates based on sex, while the relationship between parasite intensity-body weight/body lengths was determined using correlation analysis (Steel and Torrie, 1980). P - values equal to or less than 0.05 were regarded as statistically significant.

RESULTS

This study has shown that of the 100 *Clarias gariepinus* that were examined, an overall prevalence (intensity of infection) of 38% (0.38) was obtained with 23 (41.1%) as infected male and 15 (34.1%) as infected female ($p \geq 0.05$) (Table 1). Highest prevalence was observed for *Gnathostoma spinigerum* (nematode) with 17 (44.7%), followed by *Diphyllobothrium latum* (cestoda) 12 (31.6%), while the least infection by *Trypanosoma sp.* (protozoa) 9 (23.7%) ($p \leq 0.05$) (Table 2).

Table 1: Prevalence and intensity of infection of endoparasites based on the sex of *C. gariepinus* examined.

Sex	No. examined	No. infected (%)	Total No. of parasites	Intensity of infection
Male	56	23 (41.1)	28	0.41
Female	44	15 (34.1)	14	0.34
Total	100	38 (38.0)	42	0.38

NB: $p = 0.3027 \geq 0.05$

Table 2: Frequency distribution of endoparasites of *C. gariepinus* examined.

Parasite	Taxonomical group	No. of fish infected (%)	No. of parasites	Location
Diphyllobothriumlatum	Cestoda	12 (31.6)	12	Intestine
Gnathostoma spinigerum	Nematoda	17 (44.7)	21	Intestine
Trypanosoma sp.	Protozoa	9 (23.7)	9	Blood
Total		38 (38.8)	42	

NB: $p = 0.0017 \leq 0.05$

Table 3 shows the prevalence and intensity of endoparasites of *Clarias gariepinus* according to fish standard length. Highest prevalence of 12 (66.7%) was obtained in *Clarias gariepinus* within the standard length range of 28.5 -33.4cm with intensity of infection as 0.67 ($p \leq 0.05$).
Table 4 presents prevalence and intensity of endoparasites of *Clarias gariepinus* according to fish total length. Highest prevalence of 8(50%) was obtained in *Clarias gariepinus* within the total length range of 32.5-36.4 cm with intensity of infection as 0.5 ($p \leq 0.05$). Table 5 shows prevalence and intensity of endoparasites of *Clarias gariepinus* according to fish weight. Highest prevalence of 12(92.30%) was obtained from the weight range of 141-190g compared to the other weight ranges ($p \leq 0.05$).

Table 3: Prevalence and intensity of infection of endoparasites based on the standard length of *C. gariepinus*

SL (cm)	No. of fish examined	No. of fish infected (%)	Total No. of parasites	Intensity of infection
13.5-18.4	4	0	0	0.0
18.5-23.4	23	4 (17.4)	5	0.17
23.5-28.4	52	22 (42.3)	22	0.42
28.5-33.4	18	12 (66.7)	15	0.67
33.5-38.4	3	0	0	0.0
Total	100	38 (38.0)	42	0.38

SL = Standard length, NB: $p=0.0362 \le 0.05$

Table 4: Prevalence and intensity of endoparasites based on the total length of *C. gariepinus*.

TL (cm)	No. of fish examined	No. of fish infected (%)	Total No. of parasites	Intensity of infection
16.5-20.4	4	0	0	0
20.5-24.4	0	0	0	0
24.5-28.4	32	10 (31.2)	10	0.31
28.5-32.4	41	19 (46.3)	21	0.46
32.5-36.4	16	8 (50)	10	0.50
36.5-40.4	7	1 (14.3)	1	0.14
Total	100	38 (38.0)	42	0.38

TL = Total length, NB: $p=0.0027 \le 0.05$

Table 5: Prevalence and intensity of endoparasites based on the weight *C. gariepinus*.

Body weight (g)	No. of fish examined	No. of fish infected (%)	No. of parasites	Intensity of infection
91-140	59	17 (28.8)	18	0.29
141-190	13	12 (92.3)	15	0.92
191-240	14	4 (28.6)	4	0.28
241-290	9	2 (22.2)	2	0.22
291-340	5	3 (60.0)	3	0.60
Total	100	38 (38.0)	42	0.38

NB: $p=0.0019 \le 0.05$

DISCUSSION

The overall 38.0% infection rate described in this study is high particularly when compared to the 16.6% reported from Asa River and its impoundment at Ilorin (Obano *et al.*, 2010a). The intestinal parasites recovered (*Diphyllobothrium* and *Gnathostoma*) were previously reported in Northern Nigeria by Bichi and Yelwa (2010) and (Adikwu and Ibrahim, 2004). The report also showed that helminthes infections are quite common in both feral and cultured fish. It is worthy to note that infection rates vary greatly from one area to another, and this may not be unconnected with the fact that a number of factors like availability of intermediate host, susceptibility of definite host amongst others determine to a large extent the rate of infection (Obano *et al.*, 2010a).

Additionally, *Gnathostoma spinigerum* is of zoonotic significance, as man can be infected by eating inadequately cooked fish, causing eosinophilic meningitis and deep cutaneous lesions, particularly around the digits, and on the breasts (Soulsby, 1982).

In relation to size (weight and length), it was observed in this study that the percentage infection increased with increasing size. Similar observations were reported by Ayanda (2009) and Olurin and Samorin, (2006) that the longer and heavier the fish, the greater the susceptibility to parasite infection. This observation could be attributed to the fact that bigger fish provides larger surface area for the infection to multiply in numbers than in smaller ones, and also as a result of changes in diet from phytoplankton and zooplankton to insects, larvae, snails, worms and crustaceans for food as smaller fishes grow into bigger ones (Obano *et al*., 2010b).

Variations in parasitic infection among the sexes of fish studied were not significant implying that higher infection rates in either the male or female were simply by chance. This however contradicts Emere (2000), who reported differences in the incidence of infestation between male and female fish, which may be due to differential feeding either by quantity or quality of feed, or as a result of different degrees of resistance to infection. Emere and Egbe, (2006) also reported that due to the physiological state of the female, most gravid females could have reduced resistance to infection by parasites.

The presence of helminth parasitic infection in this study is enough to cause some pathological effect in fishes by reducing their growth, development and even the market value if the sources of capture were not well monitored. The presence of *Trypanosoma* species in this study is also significant, as natural infection has been reported to be very common, particularly where the leech vector is available. Similar reports were made by Baker, (1960; 1961) in *Orechromis variabilis* in Lake Victoria (54%) and *Orechromis esculenta* (54%) and in *Orechromis niloticus* (20%) in Lake George. Fish trypanosomosis have resulted in decreased haematocrit and haemoglobin levels and evidence of accelerated haemopoiesis, with *Clarias* developing ascites, renal, pancreatic and connective tissue pathologies (Eli *et al*., 2012).

In conclusion, fish parasitism constitutes a major threat to fish productivity, and the increased demand on fish as a ready and safe source of protein to humans should trigger further studies on fish fauna and their parasites.

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