

Full Length Research Paper

Comparative parasitic helminth infection between cultured and wild species of *Clarias gariepinus* in Ilorin, North – Central Nigeria

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A comparative study of the helminth parasites of cultured and wild *Clarias gariepinus* in Ilorin, North-Central Nigeria was carried out. A total of 320 *C. gariepinus* (Teugels) comprising 160 samples each of cultured and wild species were collected live from cultured and wild populations between August 2006 and March 2007. Only wild samples had all parasitic helminth infections. Five species of helminth parasites consisting of 2 cestodes, 2 nematodes and 1 acanthocephala were isolated from fish. Total number of helminth parasites recovered in all was eighty-eight. Overall prevalence of infection was 13.75%. The cestodes' prevalence of infection was 5% (1.25% for *Amonotaenia* sp and 3.75% for *Polyonchobothrium clarias*), 6.25 % (5.625% for *Paracamallanus* sp and 0.625% for *Procamallanus laevionchus*) for nematodes and the only acanthocephalan (*Neochinorhynchus rutili*) had a prevalence of 2.5%.

Key words: Helminth, parasites, *Clarias gariepinus*, Ilorin, North-Central Nigeria.

INTRODUCTION

Fish is a cheap and important source of protein. It contains lipids, minerals, oils and vitamins. *Clarias gariepinus* (Teugels) is widely distributed in Africa and it occurs mainly in quiet waters, lakes, pools but may also occur in fast flowing rivers (Teugels, 1986). It is highly priced in Nigeria either as smoked, dried or fresh. The fish is generally classified as omnivores or predators feeding mainly on aquatic insects, fish and higher plants debris as reported for catfishes in the River Ubangui, Central African Republic (Micah 1973). They have also been found to feed on terrestrial insects, molluscs and fruits. The catfishes utilize various kinds of food resources available in their habitat (Bruton, 1979b). Studies on the biology, nutrition/growth and management of catfish have been carried out (Viveen et al., 1977; Faturoti et al., 1986; Jeje, 1992; Adeyemo et al., 1994; Eyo and Olatunde 2001; Banyighi et al., 2001; Ovie and Ovie 2002).

In most part of the world, fish production is mainly from the wild. As the world population grows, fish resources are being depleted at an increasing rate as a result of environmental degradation, over harvesting, pollution thus fish production could no longer meet the demand of

the growing population. This had led to increase in the involvement of stakeholders in aquaculture. This method has also been plagued by the problems of overcrowding, poor environmental conditions and pollution which often result in reduced immunity of fish and higher susceptibility to parasites and diseases (Murray, 2005).

There is appreciable documentation of parasite fauna of *C. gariepinus* in Nigeria. One of the earliest reports in Nigeria in inland waters concerning fish parasites was that of Awachie (1966) who documented preliminary information on the parasites of fish in the Kainji reservoir. He observed that not many fishes were infected. However in a similar study, Ukoli (1969) observed heavy parasitic infection of fish species from the same reservoir. Similarly the works of Oniye et al. (2004) in Zaria, Yakubu et al. (2002) in Plateau State, Ibiwoye et al. (2004) in Bida and Akinsanya and Otubanjo (2006) in Lagos were of great value. Various parasites are associated with *C. gariepinus* in the wild and cultured environment where they cause morbidity, mortality and economic losses in aquaculture practice in various parts of the world (Subashinghe, 1995).

This study therefore reports comparison of parasitic

Table 1. List and percentage of helminth parasite recovered in *C. gariepinus* from the wild and cultured population.

HELMINTH PARASITES	WILD		CULTURED	
	No Recovered	% Recovered	No Recovered	% Recovered
CESTODES			0	0
<i>Amonotaenia sp</i>	6	68.18		
<i>Polyonchobothrium clarias</i>	18	20.45		
NEMATODES			0	0
<i>Paracamallanus sp</i>	40	45.45		
<i>Procamallanus laevionchus</i>	2	2.27		
ACANTHOCEPHALA			0	0
<i>Neoechinorhynchus rutili</i>	22	25		

helminth infection between the cultured and wild species of *C. gariepinus* in Ilorin, North-Central Nigeria.

MATERIALS AND METHODS

A total of 320 *C. gariepinus* were used for this study. 160 wild samples were caught live from Asa Dam River in Ilorin, North-Central Nigeria while the cultured samples were bought live from different fish farmers between August 2006 and March 2007. Ilorin, the capital of Kwara State is found in the Northern Guinea Savannah of Nigeria with a mean annual rainfall of 500 – 1000 mm. Asa dam is located approximately 4 km south of Ilorin Township. It is located between latitudes 80°28' and 80°52'N and longitudes 40°35' and 40°45'E. Asa reservoir has a surface area of 302 ha (Ita et al., 1985), with a maximum length of 18 km and a maximum depth of about 14 m at the dam site. The fish specimens were then transported in cold ice box to the laboratory. In the laboratory, (University of Ilorin Department of Zoology laboratory) the standard length (cm), total length (cm) were measured with the aid of a measuring board and weight of the fish (g) were measured using a salter balance. The fish were dissected to expose the alimentary canal. The alimentary canal was thereafter removed and sectioned into its various parts; Oesophagus and Stomach, Intestine and Rectum. The gut was used for parasitic examination because this is where food will be most abundant for the parasites. Each section was placed separately into dishes containing normal saline, incised and examined for parasites under a dissecting microscope. Parasites found were counted, placed in physiological saline overnight in a refrigerator to enable it stretch and relax. Thereafter the parasites were fixed in 5% formalin. (Seinhorst 1966, 1973)

Parasites were stained overnight with a weak erlich's haematoxylin solution and passed through graduated alcohol (30, 50, 70, 90% and absolute) for 45 min to dehydrate, cleared in methyl-salicylate and mounted on a slide in Canada balsam. Parasites were identified by using the texts of Yamaguti (1959 and 1961), Markevich (1963), Petrochenko (1971), Cheng (1973), Soulsby (1982), Paperna (1980; 1996) and Williams and Jones (1994). The term prevalence was applied as defined by Margolis et al. (1982). Chi – square statistics was employed to test for significance.

RESULTS

Of 320 *C. gariepinus* examined, 44 (13.75%) fishes were positive for parasitological examination. Parasitic helminth infection was recorded only in wild fish samples. The type

number and percentage of parasites recovered are shown in Table 1. A total of 88 parasites which comprised 3 classes of helminth parasites – Cestodes, Nematodes and Acanthocephala were recovered. 2 cestode types – *Amonotaenia sp* and *Polyonchobothrium clarias*; 2 nematode types – *Paracamallanus sp* and *Procamallanus laevionchus* and 1 acanthocephalan – *Neoechinorhynchus rutili* were detected. The nematodes had a prevalence of 6.25%, cestodes, 5% and the only acanthocephalan type had a prevalence of 2.5% (Table 2). Parasites were most abundant in the intestine (45.5%), closely followed by the rectum (43.2%) and the few parasites recovered from the stomach makes up the remaining percentage i.e. 11.3%. Total prevalence of infection was 27.5% for the wild fish samples and 0% for the cultured samples. Chi – square analysis showed that infection is significantly higher ($p < 0.05$) in wild than in cultured species. The intestine was the only part of the gut which has all kinds of parasites detected. There were also cases of mixed infection where one than one helminth parasite type was found in a single fish. Result also showed that apart from the nematode *Paracamallanus sp*, no other helminth was found in the rectum.

DISCUSSIONS

The result of the investigation reveals five helminthes parasitizing *C. gariepinus* from the wild in Ilorin. They are *Amonotaenia sp*, *Polyonchobothrium clarias* (cestodes); *Paracamallanus sp*, *Procamallanus laevionchus* (nematodes) and *Neoechinorhynchus rutili* – an acanthocephala. Apart from *Paracamallanus sp*, Oniye et al (2004) in Zaria area reported other helminthes recovered from the examined fishes in this study. Anosike et al. (1992) in Plateau area also reported *P. laevionchus* and *P. clarias* in *C. gariepinus*. As reported by Akinsanya and Otubanjo (2006), it may be that geo-climatic factors do not affect greatly, the kind of helminthes parasitizing *C. gariepinus*; however the same may not be said of prevalence of the parasites in the fish.

Table 2. Prevalence of intestinal helminth parasite in *C. gariepinus* from the wild (n=160).

Parasite species	Number of fish infected	Number of parasites in stomach	Number of parasites in intestine	Number of parasites in rectum	Prevalence (%)
<i>Amonotaenia sp</i>	4	2	4	-	2.5
<i>Polygonchobothrium clarias</i>	12	8	10	-	7.5
<i>Paracamallanus sp</i>	18	-	2	38	11.25
<i>Procamallanus laevionchus</i>	2	-	2	-	1.25
<i>Neoechinorhynchus rutili</i>	8	-	22	-	5

Findings indicated a total prevalence of 27.5% in wild fish samples and 0% in cultured samples. This prevalence is low compared to the findings of Anosike et al. (1992) and Onwuliri and Mgbemena (1987) who both reported 34.7% in wild and 52% in cultured and 63.0% in wild and 59.8% in cultured species respectively although the prevalence in the wild species is similar to that of Anosike et al. (1992). This probably may mean that there have been improved management practices such as avoidance of overcrowding, poor environmental conditions and pollution and good environmental conditions carried out by fish farmers in the study area. As reported by Sydenham (1974), parasitism of fish varies among different farms, rivers, streams and lakes depending on several factors prevailing and the aquatic ecosystem. It may also be that decreased contact between host and parasite is the reason for the low prevalence observed in the study compared to the above mentioned author's findings.

Nematodes have the highest relative abundance (about 48%) followed by the cestodes (27%) and then acanthocephalan (25%) (Table 2). This may be attributed to the type of intermediate host present and the prevailing physico-chemical factors of the wild site (Paperna, 1980). The relative abundance of the helminth parasites also varied from one anatomical site to another – the rectum and intestine having high relative abundance (43.2 and 45.5%, respectively). 80% of parasites found at this site are cestodes and acanthocephala. Anatomically, they lack a digestive tract and must depend on end products of digested food in their host. Acanthocephala have a spine on their head with which they attach to the host's intestine. They absorb various nutrients by specific membrane transport mechanisms. Their tegument bears some enzymes such as peptidases which can cleave several dipeptides and the amino acids are then absorbed by the worms. They also utilize glucose by phosphorylating it as soon as it is absorbed thereby creating a metabolic 'sink' into which glucose from the surrounding can flow (Hickman et al., 2006). The few parasites recovered from the stomach are expected as a high concentration of acid is secreted here to aid digestion which of course is capable of killing them. In fact the few parasites recovered at this anatomical site were all dead. Most of the nematodes were found in the

rectum. The reason for this may just be as a result of food reserve concentration and chemo-tactic response. Nematodes possess a digestive tract and so there is some degree of flexibility in their choice of anatomical site.

In conclusion, though heavy fish parasitism has not been recorded in this study, it is nevertheless worth mentioning that fish farmers continue good management practices like avoidance of overcrowding and taking care not to introduce already infected broodstock. Good culinary practices should be ensured as this will reduce greatly, any risk of infection in humans.

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