*FULL LENGTH RESEARCH ARTICLE*

# HELMINTH PARASITES OF *Clarias gariepinus* AND *Tilapia zilli* AT LAMINGO DAM, JOS, NIGERIA.

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**ABSTRACT**
The study was undertaken to the determine species diversity of fishes, the level of parasitic infections and the relationship between infection and length/weight of fishes at the Lamingo dam, Plateau State, Nigeria. The work was conducted between May-August, 2008, using drag net and the catch transferred into plastic container and and transported to the laboratory where dissection was carried and examined microscopically. Three classes of parasites were recovered from both *Clarias gariepinus* and *Tilapia zilli*. A total of 399 parasites were recovered comprising 188 nematodes, 131 cestodes and 80 trematodes. A significant difference was observed in the parasite burden of the two fishes.

**KEYWORDS:** Helminth parasites, fresh-water fishes, Lamingo dam, Jos-Nigeria.

## INTRODUCTION

Parasites of fish constitute one of the major problems confronting the modern fish culturists, and pathological conditions arising from parasitic infections assume a high magnitude especially under crowded conditions (Van Deu Brock, 1979). All fishes are potential host to many different species of parasites that cause significant mortalities among captive and wild fish stocks. Accurate identification of parasites is therefore important so that a build-up of parasite numbers can be prevented.

Information about the mode of transmission and potential intermediate hosts is often crucial to select the most appropriate management action to reduce or eliminate the problem. Present approach to treatment of parasitic diseases is largely limited to those on external surfaces and the intestinal lumen. So blood parasites and encysted worms cannot be treated effectively and economically. The Internal or endoparasites of fish inhabits the digestive tract or other organs in the body while external or ectoparasites attach themselves to the gills, skin and fins of fish (Saurabh, 2007).

The importance of fish pathology has been realized and efforts are being made to intensify work in this field in various part of the world especially in Africa. Parasites occurring in African fresh water fishes require urgent attention; particularly those that infect economically important fishes which in many cases devalue their aesthetic quality and palatability (Okorie, 1972).

Under natural conditions, 50-90% of fresh water fishes harbor at least one species of parasites (Sieszko, 1975; Daniel, 1978). Parasitism is much more common and diversified in the wild than in the farms, ponds and hatcheries. Infections occur not only due to over crowding but also due to environmental stress. As a result, fish exposed to virulent pathogens under environmental stress such as temperature, sewage, metabolic waste products of fishes, pollution and pesticides are easily infected (Wedmeyer, 1970). Cross (1933) showed that the parasitic infection tend to decrease the growth rate resulting in the stunting of fish. Sinderman (1953) studied the migration of herrings on the basis of their parasites and showed that the kinds and number of parasites may vary seasonally, geographically and with age of the host. He observed that differential mortality may also vary seasonally or with age of the host. Parasites cause damage to various organs of their hosts affecting the yield of fish products such as liver oils and so on.

Some fish parasites are important diseases producing agent in man. Among the trematodes, *Apophallus* and other *Heterophyids* probably develop in the intestine of man, and their ova is trapped in the villi, walk into circulatory system and is filtered out in various organs, including vital organs (Africa *et al.,* 1936).The aim of the study was to determine the species of fishes at the dam, types of helminth parasites, the rate of infection with these parasites and the relationship between parasite infection to length and weight of the fish.

## MATERIALS AND METHODS

The two fishes *(Clarias gariepinus* and *Tilapia zilli*) were obtained from Lamingo Dam at Shere Hill Jos, Plateau State. The investigation was conducted between May to August 2008.

**Study area:** The Lamingo Dam is located in the Shere Hill area of Jos North, Plateau State, Nigeria at latitude $9^{0}55'$ North and longitude $8^{0}55'$ East of Greenwich. It is sited 4km upstream of Kogingiri on an elevation of 1343 m and located on the Rafin Sainyi stream. Its area is about 2.2 $km^2$. The underlying rock of the dam is made up of biotite granite varying in texture between a sparsely porphritic microgranite and medium grained granite that forms a part of the shore complex.

The temperature of Jos, Plateau State is low compared to other parts of Nigeria due to its elevated altitude. Three seasons have been

recognised (Khan *et al.,* 1938) for Jos. These are a cool dry season (October to February), a hot dry season (March to April) and a rainy season (May to September). The climate in the dry season is dominated by the Northeast trade winds called harmattan, characterized by a cool dry dusty wind that blows across the Sahara. During the hot season, the average daily temperature may reach over 31$^{O}$C, whilst temperature often drops below 15 $^{0}$C in December-January.

**Collection of specimens:** The fishes were collected by using drag net, transferred into a plastic container with water and transported to the research laboratory in Zoology Department, University of Jos. Transportation was done in the morning to avoid undue stress due to temperature rise. Dead fishes were removed from the collections and examined immediately while the live ones were preserved in a plastic aquaria containing dechlorinated tap water, and examined subsequently as the investigation progresses.

**Dissection:** The body of the fish was examined for abnormalities (if any), and placed on a dissecting board. The body cavity was opened with the aid of scissors and the mesentery and connective tissue connecting loops of the gut and the liver cut and the organs separated. The gut was then placed in a large Petri dish, stretched out and cut into three regions i.e. the stomach, the intestine and the gut. Each section was then placed in a separate dish.

The separated sections were opened longitudinally to expose the inner surface which were washed into test tubes containing distilled water and decanted. A drop of the residue was placed on the slide and viewed under x 10 and x 40 objective of the light microscope.

**RESULTS**

A total of 399 parasites were recovered from the two species of fish (180). 188 (47.12%) of these were Nematodes, 131(32.83%) were Cestodes and 80 (20.05%) were Trematodes. A total of 251(62.91%) parasites were recovered from *C. gariepinus* out of which 134(53.39%) were Nematodes, 86(34.26%) were Cestodes and 31(12.35%) were Trematodes. 148(37.09%) parasites were recovered from *T. Zilli,* 54(36.49%) of these were Nematodes, 45(30.41%) were Cestodes and 49(33.11%) were Trematodes. A significant difference ($p<0.05$) was observed in the parasite burden in the two species of fish as displayed in Table 1.

Table 4 and 5 shows the incidence of Helminths in relation to Sex and Age of the 2 species of fishes. For *C. gariepinus*, the Juvenile had the highest infection 84.21% followed by the adults 76.92% but no infection among the fingerlings. More males were infected (73.90%) than females (70.40%). Similarly in the case of *T. zilli* the adults had the higher percentage infection (57.78%) followed by the Juveniles with 55.56%. Just like in *C. gariepinus,* no fingerlings were infected. Also, more males were infected (53.13%) than females (50.0%).

**TABLE 1. PARASITE BURDEN IN *C. gariepinus and T. zilli*) IN LAMINGO DAM**

| Fish species | Nematode | Cestode | Trematode | Total |
|---|---|---|---|---|
| *Clarias gariepinus* | 134(53.4%) | 86(34.3%) | 31(12.4%) | 251(62.9%) |
| *Tilapia zilli* | 54(36.5%) | 45(30.4%) | 49(33.1%) | 148(37.1%) |
| **Total** | **188 (47.1%)** | **131(32.8%)** | **80(20.1%)** | **399** |

$\chi 2 = 27.42$; df = 2; $P<0.05$

**TABLE 2. PREVALENCE OF HELMINTHS PARASITES IN *C. gariepinus* FROM LAMINGO DAM**

| Class and species of parasites | Site of infection | No Fish examined (%) | No infected (%) | No parasites recovered (%) |
|---|---|---|---|---|
| *Nematode:* | | | | |
| *Procamallanus. Leavionchus* | Intestine/stomach | 100 | 25(25) | 89(32.3) |
| *Procamallanus* spp | Stomach/intestine | 100 | 10 (10) | 45(17.9) |
| Total | | | 35(35) | 134(50.2) |
| *Cestode:* | | | | |
| *Polyonchobothrium clarias* | Stomach/intestines | 100 | 17 (17) | 51(20.3) |
| *Diphyllobothrium latum* | Gut | 100 | 8 (8) | 25 (9.9) |
| *Diphyllobothrium plerocercoid* | Gut | 100 | 3(3) | 10 (3.9) |
| Total | | | 28(28) | 96(34.3) |
| *Trematode:* | | | | |
| *Diplostomum spathaceum* | *Intestine/stomach* | 100 | 9 (9) | 31(12.4) |
| *Acanthocephalan sp* | - | 100 | - (-) | - (-) |
| **Grand Total** | | **100** | **72(72.0)** | **251(100)** |

**TABLE 3. PREVALENCE OF HELMINTHS PARASITES IN *Tilapia zilli* FROM LAMINGO DAM.**

| Class and species of parasite | Site of infection | No fish examined | No infected (% ) | No parasites recovered (%) |
|---|---|---|---|---|
| *Nematode:* | | | | |
| *Camallanus spp* | Intestine | 80 | 11(13.8) | 45 (46.4) |
| *Cestode:* | | | | |
| *Proteocephalid* | Stomach/ intestine | 80 | 18 (22.5) | 54(36.5) |
| *Trematode:* | | | | |
| *Dactylogyrus* | Skin | 80 | 5(6.3) | 19(12.8) |
| *Diplostomulium tregnna* | Intestine | 80 | 7 (8.8) | 30(20.3) |
| *Acanthocephalan spp* | - | 80 | - | - |
| Total | | 80 | 41(51.3) | 148(100) |

**TABLE 4. INCIDENCE OF HELMINTHS IN RELATION TO SEX AND AGE OF Clarias gariepinus FROM LAMINGO DAM**

| Age group | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | No examined | No +ve (%) | No examined | No +ve (%) | No examined | No +ve (%) |
| Fingerlings | 4 | 0(0) | 6 | 0(0) | 10 | 0(0) |
| Juveniles | 18 | 15(83.3) | 20 | 17(85.0) | 38 | 32(84.2) |
| Adults | 24 | 19(79.5) | 28 | 21(75.0) | 52 | 40(76.9) |
| Total | 46 | 34(73.9) | 54 | 38(70.4) | 100 | 72(72.0) |

**TABLE 5. INCIDENCE OF HELMINTHS IN RELATION TO SEX AND AGE OF *Tilapia zilli***

| Age group | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | No examined | No +ve (%) | No examined | No +ve (%) | No examined | No +ve (%) |
| Fingerlings | 4 | 0(0) | 4 | 0(0) | 8 | 0(0) |
| Juveniles | 10 | 6(60.0) | 17 | 9(52.9) | 27 | 15(55.6) |
| Adults | 18 | 11(60.1) | 29 | 15(55.6) | 45 | 26(57.8) |
| Total | 32 | 17(53.1) | 48 | 24(50) | 80 | 41(51.3) |

**TABLE 6. RELATIONSHIP BETWEEN HELMINTHS PARASITES AND THE LENGTH AND WEIGHT OF *Clarias gariepinus* IN LAMINGO DAM.**

| Age grp | Mean length (cm) | Mean weight (g) | No fish examined | Cestode | | Nematode | | Trematode | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | No +ve(%) | No parasites recovered(%) | No +ve(%) | No parasites recovered(%) | No +ve(%) | No parasites recovered(%) |
| Fingerlings | 8.2 | 25.6 | 10 | 0(0) | 0(0) | 0(0) | 0(0) | 0(0) | 0(0) |
| Juveniles | 20.6 | 54.1 | 38 | 9(23.7) | 36(41.86) | 14(36.8) | 75(56.0) | 3(9.9) | 14(45.2) |
| Adults | 26.5 | 64.3 | 52 | 19(36.5) | 50(58.14) | 21(40.4) | 59(44.0) | 6(11.5) | 17(54.8) |
| **Total** | **55.3** | **144.0** | **100** | **28(28.0)** | **86(100.0)** | **35(35.0)** | **134(100.0)** | **9(9.0)** | **31(100.0)** |

**TABLE 7. RELATIONSHIP BETWEEN HELMINTH PARASITES AND LENGTH AND WEIGHT OF *Tilapia zilli* IN LAMINGO DAM.**

| Age grp | Mean length (cm) | Mean weight (g) | No fish examined | Cestode | | Nematode | | Trematode | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | No +ve(%) | No parasites recovered(%) | No +ve(%) | No parasites recovered(%) | No +ve(%) | No parasites recovered(%) |
| Fingerlings | 6.6 | 10.6 | 8 | 0(0) | 0(0) | 0(0) | 0(0) | 0(0) | 0(0) |
| Juveniles | 12.4 | 20.5 | 27 | 4(14.8) | 19(42.2) | 8(29.6) | 24(44.4) | 5(18.5) | 21(42.9) |
| Adults | 16.9 | 40.4 | 45 | 7(15.6) | 26(57.8) | 10(22.2) | 30(55.6) | 7(15.6) | 78(57.1) |
| **Total** | **35.9** | **71.4** | **80** | **11(13.8)** | **45(100.0)** | **18(22.5)** | **54(100.0)** | **12(15.0)** | **49(100.0)** |

**DISCUSSION**

The results of this work revealed the presence of 2 species of fishes in the Lammingo Dam (*Clarias gariepinus* and *Tilapia zilli*) infected by 3 classes of parasites, namely nematode, cestode and trematode. Of the classes of parasites infecting *C. gariepinus,* nematode had the highest total followed by cestode and trematode. In the case of *T. zilli*, cestodes was the highest, followed by trematodes and then nematodes. This finding supports earlier work of Mgbemena (1983) who discovered higher number of nematodes infection on *C. tilapiae* while Akhamerov (1980) who reported higher infection rate of cestodes in *T. lazer* in the basin of the river Amur (Russia).

Though some earlier workers found that Acanthocephala was the commonest parasites of fresh water fishes in the tropics, none was discovered in this research. Both Shotter (1974) and Mgbemena (1983) reported high prevalence of Acanthocephalan in fish during the dry season. The absence of acanthocephalan in this research could probably be due to the fact that it was carried out during the rainy season.

The present result and earlier work of Cromptom (1973) reported that worms have preference for region of attachment in the alimentary canal of fish. The distribution of parasite in the fishes showed a clear preference for the intestine and stomach where there is the highest concentration of the worms followed by the gut which had a very sparse population of the worms. The preference for intestine and stomach regions as sites of attachment could be attributed to the availability of food in these region. The extension of the worms to the fore gut occurred when there was heavy concentration of worms in the stomach and intestine region owing to lack of space. Even though the presence of parasites in the intestine of fish has no known adverse effects on the host, it may block the lumen of the alimentary canal leading to poor feeding and growth, as food part of the food already absorbed by the intestine is in turn absorbed by these worms. These worms also causes lesions at the site of attachment as was observed in this study even though in most cases lesions were not noticed.

The incidence of helminth parasites in relation to sex and age was examined, in *C. gariepinus.* The Juveniles had the highest infection with 84.21% followed by the adults with 76.92%. No infection was found in the fingerlings. The male fingerlings had higher infections (73.90%) than the female fingerlings with 70.4 %.

In *T. zilli,* the adults had the highest percentage infection (57.78%) followed by the Juveniles with 55.56%. No infections were found in the fingerlings. Here also, the males had the highest percentage of infection with 53.13% than the females with 50.00%. Mgbemena (1983) working with *C. lazera* found a higher infection in male in the wild even though the difference was not significant. Pande (1938), observed that Juveniles were affected with more parasites than the adults, this could probably account for the reason why there is growth retardation in them which prevent them from reaching the adult size hence making them look more of Juveniles.

The problem of fish infestation by parasites in the dam could best be handled through proper management technique of elimination of all the conditions that could favour parasite infestationsuch as occasional surveillance and periodic checks of the water body for parasites (Carpenter, 2001). It is always mentioned that parasites could be controlled by elimination of over crowding, any way one could attribute this to the conditions the fish is exposed to. In the case of Lamingo dam over crowding is not a serious problem as probably pollution.

In the present study environment, farmers are allowed to dispose off their waste and faecal matters therein which is subsequently washed into the dam thus providing suitable conditions for parasites to thrive. Both Watson and Dick (1980) and Modhavi, (1980) stated that fish come in contact with worms by feeding on the crustacean intermediate hosts harboring the larval forms as such they become infected.

Since it has been observed that parasite infection of fish affects its palatability and aesthetic value as well as a resultant death of a good number of fishes especially in the wild, it is necessary to develop a method of control. Though one expects more parasitic infections in the wild than in the cultured pond, the species diversity is more or less the same in both locations because the use of artificial feeds in the cultured ponds creates a condition for the proliferation of parasites and also overcrowding. These could be prevented by elimination of infected fishes from the healthy ones, removal and destruction of dead fish and disinfecting the premises, materials and ponds. Awareness should be given to home makers and cooks to restrain from tasting the raw fish to test their skills in flavoring and also scientists should educate the public especially in the interior communities on fish parasites and how to control them.

Inspite of all these, it was observed that the rate of infection in this study was below a lethal level as no resultant disease was observed.

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