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Full Length Research Paper

Diversity, intensity and prevalence of parasites of cichlids in polluted and unpolluted end of Eleyele Dam in Ibadan, Oyo State

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This study aimed to investigate the diversity, intensity and prevalence of parasites in Cichlids. A total of 354 specimens of cichlids was sampled in polluted and unpolluted ends of Eleyele River, Ibadan, Nigeria and examined for parasites. The total prevalence was 57.34%.Recovered parasites were*Clinostomum tilapiae, Euclinostomum heterostomum,Neascus, Allocreadium ghanensis, Phagicola longa, Alloglossidium corti* and the acanthocephalan;*Acanthogyrus tilapiae* and *Acanthella.Clinostomum tilapiae*had higher prevalence and abundance (42.90%) with *Allocreadium cort*i recording least abundance (0.49%).*Tilapia zilli* was the most abundant (41.53%) among the fish hosts but *Oreochromis niloticus* harboured the highest percentage of parasites (80.00%). The fish hosts in the polluted end of the river harboured the highest percentage of parasites(71.18%)against (43.50%) parasites recovered from the unpolluted end. There was a significant difference in the parasites harboured (P<0.05). Heavy infection with a broad number of parasites in fish hosts could reduce performance and productivity of the species, especially in fish farming.

Keywords: Cichlids, parasites,polluted, unpolluted, Eleyele Dam.

INTRODUCTION

Fish farming occupies a position second only to crop production in the food sector in Nigeria (Gnadadoss, 1980). Fish culture provides a large reservoir of parasitic pathogen common to both wild and cultured fish. With the growing interest in the development of fish farming and culture especially in the tropics, there is an increasing awareness of the importance of fish diseases as one of the detrimental factors in the venture. High population of fish culture favours the spread of many diseases and parasites (Anyanwu, 1983).

Parasite infections in fishes cause production and economic losses through direct fish mortality, reduction in fish growth, fecundity and stamina, increase in the susceptibility of fish to diseases and predation and the high cost of treatment (Cowx, 1992). Many phyla of the animal kingdom have representatives that are parasites of cichlids, where the helminthes are a major group of parasites involved (Awa *et al.*, 1996).Helminthes are among the most important parasites which include nematodes, trematodes, cestodes and acanthocephalans affecting both wild and cultured fishes (Hussen *et al*., 2012). The commonest infection are caused by trematodes:Clinostomum sp., *Euclinostomum sp* and nematode *Procamellanus sp*. Ukoli (1992) and Okaeme (1991) also reported this observation.

The life history of digeneans which parasitize fish involves three hosts; an aquatic snail (first intermediate host), fish (second intermediate host) and a fish eating bird such as Heron (final host) (Ukoli, 1992). He also reported the susceptibility of *Oreochromis niloticus, Sarotherodon galilaeus* and *Tilapia zilli* to *Clinistomum tilapiae* infection. Acanthocephalan (spiny- headed worms) have a characteristic retractable proboscis at the anterior end which is armed with posterior pointing hooks.

This organ of attachment anchors the worm in the intestine wall of the fish host (Egusa, 1992).The larval stages of Acanthocephalans occur within crustaceans or insects. Severe outbreaks have occurred in fish farms where large number of infected shrimps were introduced in an effort to improve the growth rate of fish (Roberts and Shepherd, 1996). Pathogenic effects arise from abrasions and lesions caused by the proboscis during attachment. When it penetrates only the intestinal epithelium, the host reaction is minimal weight loss, growth retardation and mortality of fish occur if the parasites are present in large numbers (Cowx, 1992).

Parasites disease of fish (and livestock) reduces the amount of food available to people around the globe. It is imperative therefore to investigate the relationship between the environmental factors as it affects the parasites that affect production and quality ().Due to the importance of fish as one of the major source of obtaining cheap protein, studies on this aspect of biology, morphology and diseases of fish is very important. This study was therefore conducted to provide information on the endo parasites of Cichlids because of their importance in the artisanal fisheries in Nigeria sinceparasitic infections are common in natural water bodies, affecting fish growth, development and reproduction. Fish parasites and disease remain some of the most important problems confronting the fishery biologist since fish may serve as intermediate or definitive host of parasites that are harmful to man. Fish parasites are likely to become a serious health issue if more attention is not paid to the study of these parasites.

MATERIALS AND METHODS

Study area

Eleyele Dam which picks its source from river Ona is located between latitudes 7°26'N and longitudes 3°52"E with an altitude of 125m above sea level. Seasonal temperature occurs with the mean minimum temperature (24.5^{0}C) occurring in August when there is dense cloud cover. The climatic condition of the study area is characterized by two distinct seasons, the wet and dry seasons respectively, the mean annual rainfall is 1262.3mm and the vegetation is typical rain forest. The inhabitants of the area speak mainly Yoruba language and are basically fishermen and farmers.

Collection, Identification and Processing of Fish samples for parasite examination

A total of 354 live Tilapia species were collected at the two ends forth nightly and samples were collected between 0700 and 1000hours at each end as recommended by Adebisi (1981).The fishes were caught by the fishermen using cast nets (mesh size, 4cm^2) which was set in the evening and retrieved the following morning. The fishes were placed in an ice-chest and trans-ported to the Fishery laboratory in the Department of Zoology, University of Ibadan for identification, processing and examination for parasites. The fish samples were identified using Field Guide to Nigerian Fresh Water Fishes by Olaosebikan and Raji (1998).

The sexes of the fishes were determined by either the presence or absence of an intromittent organ on the ventral side just before the anal fin which as confirmed later by the presence of testes or ovaries during dissection. The total length and standard length measurements were taken using a calibrated dissecting board. The weight of each fish was taken using a weighing balance (metler 0.01g). The skin, scales, eyes and gut of the fishes were all removed with the aid of a dissecting tool and these organs were immediately immersed in a saline water to aid the emergence of parasites.

Excystment of Cysts

Helminths cysts were excysted by subjecting them to slight increase in temperature in a bile solution as medium (Wright, 1977).

Preservation of Parasites

The parasites wereallowed to die and stretch fully in normal saline water for 30min after which they were fixed in Alcohol- Formalin-Acetic Acid (AFA) solution for 24hours and later preserved in 70% alcohol with two drops of glycerine to prevent contraction of the worms and complete evaporation.

The staining method was used for the treatment of Acanthocephala where the parasites were dehydrated using alcohol at different concentrations: 70% alcohol, 85% alcohol, 95% alcohol and 100% alcohol for a period of 10min each. After dehydration, the parasites were cleared in xylol and mounted in Canada balsam (MAFF, 1971).The slides were observed under a light microscope and the parasites identified using information provided by Yamaguti, 1963).

Statistical analysis

The relationship that exists between the parasite burden and other tested variables (length, weight and sex) were compared using correlation analysis and t-test. P-values equal to or less than 0.05 were considered significant (Steel & Torrie, 1980).

RESULTS

Figure 1 shows that *Oreochromis niloticus* had the highest number of parasite infestation followed by *Tillapia*

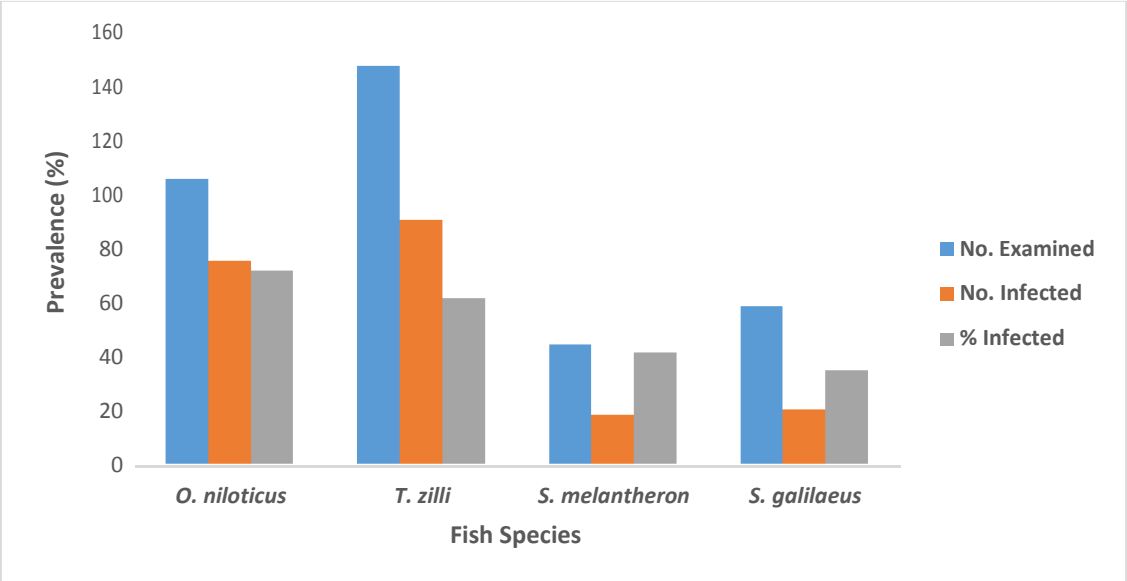

Figure 1. Infection Rate of Fish Hosts.

Table 1. Relationship between the Sex of Fish Hosts and Infection Rate.

Fish spp	No Examined		No Infected		% Infection	
	Male	Female	Male	Female	Male	Female
O. niloticus	70	35	47	28	67.14	80.0
T. zilli	83	64	50	40	60.24	62.5
S. melanotheron	14	30	09	09	64.28	30.0
S. galilaeus	37	21	09	11	24.32	52.38
Total	204	150	115	88	56.37	58.67

X^2 cal= 5.333[a], x^2 tab= 0.004, df= 1, P= 0.377

zilli and the least infection was found in *Sarotherodon galilaeus.*Statistical analysis showed that there was no significant difference in number of infected fishes (P> 0.05).

Table 1 shows that the females were more infected with parasites than the males except in *S. melanotheron* where the males recorded 64.28% infection against the females 30.00%. However, there was no statistical difference (p>0.05) in infection according to their sexes.

Table 2 shows that the fish hosts in the polluted end of the river harboured more parasites than the fish hosts at the unpolluted end. There was a significant difference in the level of infection at both ends. At the both ends, *O. niloticus* recorded the highest number of infection (84.9%) and (57.7%) while the least were recorded in *S. galilaeus* (31.0%) and *S. melanotheron* (31.8%) respectively.

The fish hosts with sizes 21-50.9 to 111-140.9 recorded the highest percentage of infection with the least recorded in size 10-20.9 (Table 3).

According to the location of the parasites in the fish hosts, the intestine harboured most of the parasites which are mainly Trematodes while the gonads and the mouth harboured the least parasites (Table 4).

Among all the parasites recovered, *Clinostomum tilapiae* was the most abundant with the least in *Allocreadium ghanensis*. There was a significant difference (p<0.05) in the abundance of the parasite species (Figure 2).

DISCUSSION

The study revealed a high prevalence of infection rate of (57.34%) in all the fishes examined. This is similar to the findings of Amaechi (2015) in Ilorin, South western Nigeria. Six species of helminths, recovered were;*Euclinostomum heterostomum,Clinostomum tilapiae, Neascus, Allocreadium ghanensis, Phagicola longa and Alloglossidium corti* with two *Acanthocephalan; Acanthogyrus tilapiae and Acanthella*also recovered. These parasites have also been recovered from cichlids and other fresh water species by (Ukoli 1970; Olurin and Somorin, 2006; Ohaeri (2012) whonoted that the occurrence of *E.*

Table 2. Prevalence of Parasites at the Polluted and Unpolluted End of the Study Area.

Fish Host	Polluted End				Unpolluted End			
	No Examined	No Infected (%)	Parasite Recovered	Mean No per Infected Host	No Examined	No Infected (%)	Parasite Recovered	Mean No per Infected Host
O. niloticus	53	45(84.9)	90	0.043	52	30(57.7)	58	0.058
T. zilli	73	61(83.6)	84	0.031	74	29(39.2)	51	0.058
S. melanotheron	22	11(50.0)	43	0.148	22	7(31.8)	48	0.240
S. galilaeus	29	9(31.0)	61	0.198	29	11(37.9)	23	0.123
Total	177	126(71.18)	278		177	77(43.50)	180	

Table 3. Size of Fish hosts (cichlids) in relation to Infection withparasites**.**

Fish	Weight (g)	No Examined	No Infected (%)	%Mean per Infected Host	% Mean Per Host
O. niloticus	10 – 20.9	25	14 (56.0)	18.69	7.15
T. zilli		23	11(47.82)	16.36	9.09
S. melanotheron		5	2(40.0)	16.80	50.00
S. galilaeus		8	2(25.0)	17.60	50.00
O. niloticus	21 – 50.9	38	29(76.31)	40.05	3.45
T. zilli		42	24(57.14)	41.48	4.17
S. melanotheron		7	3(42.86)	46.93	33.33
S. galilaeus		14	3(21.43)	45.58	33.33
O. niloticus	51 – 80.9	19	16(84.21)	70.02	6.25
T. zilli		28	17(60.71)	74.34	5.88
S. melanotheron		18	6(33.33)	74.63	16.67
S. galilaeus		20	9(45.00)	62.75	11.11
O. niloticus	81 – 110.9	15	10(66.66)	93.20	10.00
T. zilli		43	29(67.44)	93.45	3.45
S. melanotheron		6	3(50.00)	103.6	33.33
S. galilaeus		11	3(27.27)	97.37	33.34
O. niloticus	111 – 140.9	8	6(75.00)	124.93	16.67
T. zilli		11	9(81.81)	119.11	11.11
S. melanotheron		8	4(50.00)	115.83	25.00
S. galilaeus		5	3(60.00)	156.83	33.33

heterostomum and *C. tilapiae* were widespread amongst cichlids.The trematodes recovered weremost abundance in the intestine which are associated with the digestive activity that normally results in the release of parasite oval/ cysts in food particles.

Hussen *et al*., (2012) reported that helminths are mostly found in fresh water fishes where factors such as parasite species and its biology, host and its feeding habitats, physical factors, hygiene of the water body and presence of intermediate hosts contribute to their prevalence and intensity. *Clinostomum tilapiae* larvae dominated the parasites species of *O. niloticus* observed in this study where they were found beneath the operculum, in the pharyngeal region and on the gills. This result is similar to those of Aloo (2002) and Ochieng *et al.,* (2012) who observed *Clinostomum* spp. below the operculum and in the pharyngeal region in *Oreochromis leucostictus* in Lake Naivasha.*O. niloticus* feeds mainly on benthic materials, including detritus, by picking up larval stages of parasites. The metacercariae of *Clinostomum* in the specimens of fish host suggested the presence of snails in the sites of study which are the first intermediate hosts of parasites (*Clinostomum*). The metacercariae of *Clinostomum* is known to damage the muscles of fish, making it degusting and unsalable (Coulibaly, 1995).

Acanthella and Acanthogyrus tilapiae are the Acanthocephalan parasites recovered and were restricted to the fish intestine. Differences in physical environment in the gut, availability, nature, and amount of food supply were factors that most likely limit the distribution of parasites in different sections of alimentary tract (Nkwengulila and Mwita, 2004). Hence, the preference of Acanthocephalans for intestinal region as site of attachment could be attributed to food availability in this region. Acanthocephalans do not have a gut, nutrients from the lumen of the host gut are absorbed across the body wall of the parasites. Amin et al. (2008) reported that A. tilapiae was better adapted to some cichlid hosts than to others.In this study, more females were infected than males ($p<0.05$).This could be attributed to

Table 4. Distribution pattern, Location and Parasites recovered in Fish Hosts.

Parasite	Taxonomic Group	Location	No of Infected Fish (%)	No of Parasites
Clinostomum tilapiae	Trematoda	Operculum, gills, intestine, body cavity& gonads	87(42.9)	206
Acanthogyrus tilapiae	Acanthocephala	Intestine	24(11.8)	51
Euclinostomum heterostomum	Trematoda	Intestine	10(4.93)	22
Acanthella	Acanthocephala	Intestine	35(17.2)	79
Neascus	Trematoda	Intestine	10(4.93)	26
Allocreadium ghanensis	Trematoda	Intestine and Mouth	11(5.42)	21
Phagicola longa	Trematoda	Intestine	25(12.3)	50
Alloglossidium corti	Trematoda	Intestine	1(0.49)	3
Total			**203**	**458**

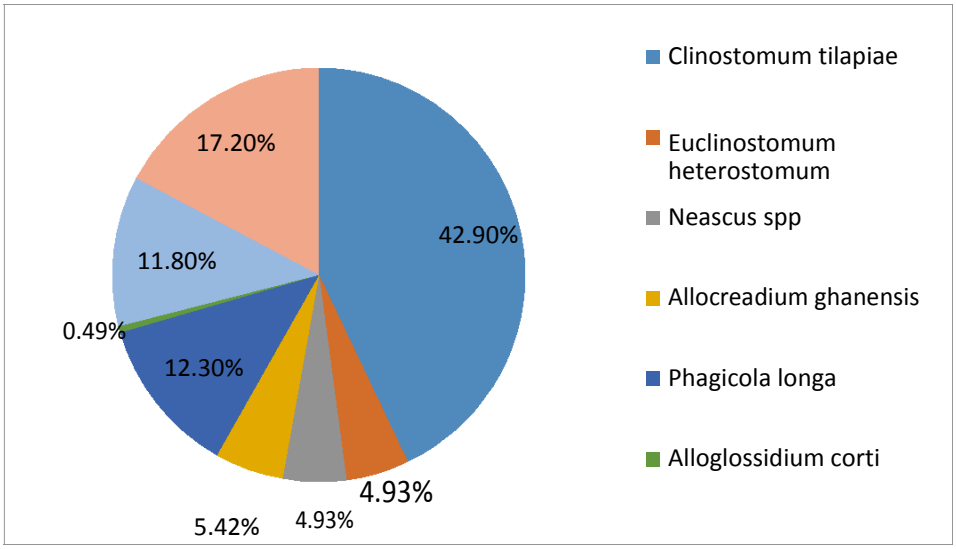

Figure 2. Prevalence of Parasite species in the Fish Hosts.

differential feeding pattern which could be in terms of quality and quantity. It could also be attributed to differences in the degree of resistance to infection. However, this result disagrees with the findings of Olurin *et al*., (2012) and Biu and Nkechi, (2013).

CONCLUSION

The parasites of fish ought to receive more attention and study. The most practicable method of controlling Digenean infectionin water bodies is the elimination of snail vectors.

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