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A survey of endohelminth parasites of fishes from water reservoir and Elemi River in Ado-Ekiti, Ekiti State, Nigeria

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ABSTRACT: A survey of endohelminth parasites of fishes from a Water Reservoir and Elemi River in Ado-Ekiti state was carried out. Out of 345 fish specimens belonging to eight species caught from the Water Reservoir, only 167 (48.4%) were infected while out of 279 specimens of different nine species, only 175 (62.7%) were infected in River Elemi. Parasites encountered during the study were one species of trematode, *Clinostomum tilapiae*, two species of nematode namely *camallanus* and *Procamallanus sp.* and an acanthocephalan parasite. This result showed low helminth parasite diversity but the prevalence of infection was relatively high. The prevalence of infection from the two sites was highest in the clariids and followed in descending order by *Hepsetus odoe, Labeo coubie,* the cichlids and *Ctenopoma kingsleyae*. The results also revealed that size/age and sex influence the degree of helminth infection in fishes. Considering the fish-man interactions in recent time, these findings have substantial economic and public health implications.

Key words: Endohelminth parasites; Fish; Water Reservoir; Elemi River; Ado-Ekiti, Nigeria.

Introduction

Parasites constitute one of the major problems confronting fisheries production. In Nigeria, parasites and the diseases caused have not received any serious attention because bulk of fish locally produced and marketed are under artisanal extensive wild fish capture. However, with the demand outstripping supply (1), intensive culture of fish is gathering momentum. Therefore, a survey knowledge of the parasito-fauna especially helminths of indigenous fishes is needed. This is because helminth parasites can frustrate the efforts of growing more fish as they are usually a potential source of discomfort for fishes (2). Helminth infections have also been remarked to disfigure a fish thereby lowering the market value for such fish (3).

There is a rich helminth parasite fauna among freshwater fishes in Nigeria (4,5). Apart from few reports of Ukoli (3) on helminth infection of fish in Kainji Lake and Benue River, Onyia (6) on parasites of fishes in Lake Chad and Ugwuzor (5) on helminthic parasites of fishes in Nigeria. Therefore, this work which surveyed the occurrence of endohelminth parasites of fish fauna from a Water reservoir and River Elemi, both in Ado-Ekiti, Ekiti State will secure additional information on the studies carried out on parasites of fishes in NIgerian Freshwater. The present study is the first to be carried out in Ekiti Area.

Materials and Methods

Study sites

Ado-Ekiti Water Reservoir was built in early 60s by damming Ireje river at the Southern part of Ado-Ekiti, a city that lies on Latitudes 7°37' and 7°39'N and Longitude 5°13'E in Southwestern Nigeria (now capital city of Ekiti State). The reservoir was built to provide potable water for Ado-Ekiti and its environs and at the same time enhances opportunity for capture fishery. The reservoir has been adequantely described by earlier workers (7 and 8). River Elemi takes its source near Igede-Ekiti and flows through the north-eastern end of Ado-Ekiti for over a distance of 34.4km to join Ogbese river. It is a perennially flowing water that drains many parts of Ekiti land.

Field and laboratory procedures

The fishes were captured using set gill nets of 25mm and 50mm mesh sizes and cassava - baited local traps with funnel-shaped entrances. These were set in shallow areas near the edges overnight and harvested early the next morning. The caught specimens were transported in ice-chest bot to the laboratory for subsequent treatments which included sorting into taxonomic categories, body weight and standard length measurements. Based on measurements, the different species were categorised into juveniles, preadults and adults.

The fishes were individually examined for helminth parasite. The skin, fins and opercular region were scrutinized using hand-lens for any helminth parasite occurrence. Also, the operculum of each fish was cut opened for parasite occurrence in the gills. Subsequently, each fish was dissected and the gut region cut into different sections (mouth, Oesophagus, stomach and intestine) were examined for endohelminth parasite. Extraction of parasites was done using a brush and dissecting pins after rinsing the sections of the gut in 10% saline solution in petri dishes. The different groups of helminths recovered were preserved as described by Ugwuzor (5), the parasites were stained according to (9) while identification was done with the aid of systema Helminthum (10).

Results

624 fish specimens were caught and examined for helminth parasites from both study sites. Table 1 summarizes the nature of helminth infection of the fishes from the two sites. Out of the 345 fishes of eight different species caught in the water Reservoir only 167 (48.4%) were infected while 175 (62.7%) out of the 279 specimens of nine species caught from River Elemi had helminth infection. The helminths encountered in all fishes were *Acanthocephalus sp* of acanthocephalan group, *camallanus* and *procamallanus* species of the nematode group while *clinostomum tilapiae* was the only trematode type. nematode members were of the commonest occurrence in both habitats and followed by acanthocephala in the River of trematodes in the Reservoir. Trematodes recovered were at metacercariae stage and they burdened mainly the cichlidae from both study sites. The infection level of fishes from the two sites was highest in the family clariidae and followed in descending order by *Hepsetus odoe, Labeo coubie* (in the river only), *Tilapia zilli, Sarotherodon galilaeus, Ctenopoma kingsleyae, T. melanopleura and Oreochromis niloticus.* The data in Tables 2 and 3 recorded in details the varying degrees of infection of the body regions in which the intestinal region supported the highest prevalence followed by the gills in both sites. There was no helminth recovered from the coelon.

The prevalence of helminth parasites in the fishes relative to the size as revealed in Table 4 shows that adults were more infected than the pre-adults and followed by the juveniles. The ratio and female to male infection in Water reservoir was 1:1.8 while it was 1:1.6 in River Elemi (Table 5). Both sites showed that there was more prevalence of infection in male fish species than in female species.

Table 1. Prevalence of infection and parasite burden of the fish caught in the two habitats

		WATER RESERVOIR						RIVER ELEMI					
				PARASITE BURDEN						PARASITE BURDEN			
FISH SPECIES	FAMILY	No examined	Number/% infection*	A	N	T	Total	No examined	No infected % infection*	A	N	T	Total
Tilapia zilli	Cichlidae	98	47(48.0)	18	63	84	165	26	15(57.7)	43	82	51	176
Tilapia melanopleura	"	36	15(41.7)	23	53	78	154	21	11(52.4)	50	98	23	171
Oreochromis niloticus	"	42	6(14.3)	07	28	11	46	17	5(29.4)	-	65	07	72
Sarotherodon galilaeus	"	67	31(46.3)	31	97	42	170	30	16(53.3)	16	153	48	217
Hepsetus odoe	Hepsetidae	38	26(68.4)	41	54	08	103	37	24(64.9)	62	86	-	148
Ctenopoma kingsleyae	Anabantidae	14	5(35.7)	04	34	-	38	31	19(61.3)	41	69	-	110
Clarias gariepinus	Clariidae	29	21(72.4)	-	182	17	199	48	37(77.1)	17	232	12	261
Heterobranchus bidorsalis	"	21	16(76.2)	02	186	13	201	36	27(75.0)	16	256	13	285
Labeo coubie	Cyprinidae	-	-	-	-	-	-	33	21(63.6)	12	76	02	90
TOTAL		345	167(48.4%)	126	697	253	1076	279	175(62.7%)	257	117	156	1530

A = Acanthocephala
N = Nematodes
T = Trematode

* % infection in parenthesis

Table2. Occurrence of endohelminths in the gut regions of different fishes from the water Reservoir

		GILLS			MOUTH			OESOPHAGUS			STOMACH			INTESTINE		
FISH SPECIES	No infected	A	N	T	A	N	T	A	N	T	A	N	T	A	N	T
Tilapia zillii	47	-	-	51	-	-	3	3	11	-	-	16	-	15	36	30
Tilapia melanopleura	15	04	-	36	02	-	01	7	05	02	-	20	-	10	28	37
Oreochromis niloticus	06	02	-	11	-	-	-	-	06	-	-	12	-	05	10	-
Sarotherodon galilaeus	31	-	-	28	04	06	02	06	11	03	03	16	-	18	64	09
Hepsetus odoe	26	18	-	06	04	-	-	-	11	-	-	20	-	19	23	02
Ctenopoma kingsleyae	05	-	-	-	-	-	-	-	-	-	-	8	-	04	26	-
Clarias gariepinus	21	-	-	14	-	-	-	-	04	-	-	11	-	-	167	03
Heterobranchus bidorsalis	16	-	-	10	-	06	-	-	11	-	02	-	-	-	169	03
TOTAL	167	24	-	156	10	12	06	16	59	05	05	103	-	71	523	86
% Prevalence		61.7	-	61.7	7.9	1.7	2.4	12.7	8.5	1.9	3.9	14.8	-	56.4	75.0	34.0

A = Acanthocephala
N = Nematodes
T = Trematode.

Table 3. Occurrence of endohelminths in the gut regions of fish species caught from River Elemi

		GILLS			MOUTH			OESOPHAGUS			STOMACH			INTESTINE		
FISH SPECIES	No infected	A	N	T.	A	N	T.	A	N	T	A	N	T	A	N	T
Tilapia zillii	15	01	-	36	-	-	02	-	07	-	04	14	-	38	61	13
Tilapia Melanopleura	11	11	-	18	-	-	-	06	26	-	-	05	-	33	67	05
Oreochromis niloticus	05	-	-	07	-	-	-	-	18	-	-	06	-	-	41	-
Sarotherodon galilaeus	16	-	03	28	-	-	-	07	41	02	02	16	-	07	93	18
Hepsetus odoe	24	26	-	-	-	-	-	08	16	-	-	-	-	28	70	-
Ctenopoma kingsleyae	19	09	-	-	-	-	-	-	16	-	01	-	-	31	53	-
Clarias gariepinus	37	06	04	07	-	-	-	-	37	02	-	61	-	11	130	03
Heterobranchus bidorsalis	27	06	10	10	-	-	01	-	51	-	03	68	-	07	127	02
Labeo coubie	21	03	-	02	-	-	-	-	-	-	-	09	-	09	67	-
TOTAL	175	62	17	108	-	-	03	21	212	04	10	179	-	164	709	41
% prevalence		24.1	1.5	69.2	-	-	1.3	8.2	18.9	2.6	3.9	16.0	-	63.8	63.5	26.3

A = Acanthocephala
N = Nematodes
T = Trematode.

Table 4: Prevalence of endohelminth parasites in fishes relative to host size/age.

Age Group	Water Reservoir			River Elemi		
	No. Examined	No. Infected	% Infection	No. Examined	No. Infected	% Infection
Juveniles	57	5	8.8	61	7	11.5
Pre-Adults	102	40	39.2	78	51	65.4
Adults	168	122	65.6	140	117	83.6
Total	345	167	48.4	279	175	62.7

Table 5: Prevalence of helminth parasites inthe fishes relative to host sex.

Fish Species	Water Reservoir		River Elemi	
	No. of males infected	No. of females infected	No. of males infected	No. of females infected
Tilapia zillii	30 (63.8)	17 (36.2)	9 (60.0)	6 (40.0)
Tilapia melanopleura	9 (60.0)	6 (40.0)	6 (54.5)	5 (45.5)
Oreochromis niloticus	3 (50.0)	3 (50.0)	4 (80.0)	1 (20.0)
Sarotherodon galilaeus	19 (61.2)	12 (38.7)	9 (56.3)	7 (43.7)
Hepsetus odoe	18 (69.2)	8 (30.8)	13 (54.2)	11 (45.8)
Ctenopoma kingsleyae	5 (100.0)	–	17 (89.5)	2 (10.5)
Clarias gariepinus	12 (57.1)	9 (42.9)	22 (59.5)	15 (40.5)
Heterobranchus bidorsalis	11 (68.8)	5 (31.2)	15 (55.6)	12 (44.4)
Laboeo couble	–	–	12 (57.1)	9 (42.9)
Total	107 (64.1)	60 (35.9)	107 (61.1)	68 (38.9)

Percentage of host infected in parentheses.

Discussion

The overall prevalence of 62.7% in River Elemi and 48.4% in the Reservoir showed a higher percentage infection of fishes when compared with the studies of (2 and 5). This observation indicates that large number of different fishes in the study areas were exposed to helminth infection probably due to a variety of ecological habitats that inhabit the various crustaceans and birds which act as intermediate hosts for the parasites. Cyclops have been identified as intermediate hosts for *camallanus* and *procamallanus* in Jos area (2) while herons and kites were reported as the definitive hosts of *Clinostomum tilapiae* (2 and

11). The high nematode burden of fishes from both study sites could be due to huge populations of the cyclops which are intermediate hosts of the parasites accroding to (2).

Though, there was no significant different ($p>0.05$) in nematode prevalence in both sites, the 'standing' nature of the Reservoir favours the growth of crustaceans that accounted for the slight burden of nematode at the site. The prevalence of acanthocephalan infection in fishes form the River could be possibly due to the ecological conditions which encourage the intermediate hosts which are yet unknown (2). The river's environment which could be regarded as 'wild' is still relatively undisturbed unlike the Reservoir where artisanal fishery operates. The herons and cattle egrets which were observed more frequently in the Reservoir than River Elemi were suspected to be the definitive hosts of the metacercariae of *Clinostomum tilapiae*. These birds could defaecate and vomit into the water bodies while drinking from where fishes acquire the infections. The findings of this study agree with the report of (3) that heavy cestode infection in Kainji dam area was as a result of cattle egret droppings in the water.

Accordings to (12), the feeding habits and types of diets in fishes are integral in the occurrence of helminth infection. Among the various fish species, the highest prevalence was recorded in the clariids which are omnivorous feeders followed by the *Hepsetus odoe* that is a carnovore. The gregarious behaviour in addition to the feeding habits of the cichlids accounted for the average prevalence of infection recorded in the group.

Nutritional materials are one of the metabolic dependent factors of helminth parasites and hence one does not wonder with the results shown in Tables 2 and 3. The intestine provides nutritional requirements for the worms because the soluble products of digestion of the hosts are available in this region. This region also provides an alkaline medium of high encymatic activity which does not give harsh bioenvironment to parasites. Ugwuzor (5) had made a similar observation in Imo river. The high occurrence of the worms in the gills especially the metacercariae of trematodes may be explained by the fact that many need high osmotic tension and oxygen to control maturation which this region offers the parasites. The migratory act and cleptic nature of helminths particularly the nematodes explain the fauna in oesophagus and stomach which lack nutritional materials.

The highest prevalence recorded in the adult fishes may be due to the voracious activities of the group because of their greater demand for food materials necessary for growth and reproductive activity. Their exposure to food items containing parasite stages was high. A similar earlier result was obtained by (5). The differences in the prevalence of infection between males and females have been observed by previous workers (2, 5). The observation in this study seems to be due to the more foraging habit of the males than the females resulting in a higher exposure in infection. Caro et. al. (12) also suggested that the increased reproductive hormonal level in females may increase resistance to infection.

With the increasing awareness that fishes have a positive economic status for cheap source of protein, the present high infection rate at these study sites is enough to elicit pathological effects on fishes by retarding their growth or even their death. Not only this, the potential of the human population becoming infected by parasites whose vector host is fish in this area is possibly high. herefore, it is considered necessary that proper and much more studies especially on the life cyccles of the helminth parasites of fishes are carried out to improve fish production in Nigeria and to remove the possibility of human infection.

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