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PARASITES OF THE CICHLID FISHES IN WATER RESERVOIR OF FEDERAL UNIVERSITY OF AGRICULTURE, ABEOKUTA, NIGERIA

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ABSTRACT

A survey of parasites of Tilapia species (Family; Cichlidae) was carried out at the Federal University of Agriculture, Abeokuta Reservoir. A total of 150 specimens belonging to four genera and species were examined for parasites. Of the total number examined 16.0% were infected with various types of parasites. Parasites encountered during the study included flagellate protozoan, *Ichtyobodonecatrix* (96.0%), species of annelid, *Piscicola sp.*(1.6%), species of nematode, *Cucullanus sp.*(1.6%), and species of cestode, *Caryophyllaeidessp* (0.8%). This result showed low prevalence of infection as well as low parasites diversity. The prevalence of infection was highest in *Oreochromis niloticus* (29.0%) and followed in descending order by *Hemichromis fasciatus* (16.7%), Sarotherodon *galilaeus* (14.3%) and *Tilapia zillii* (10.5%). The skin (60.7%), gills (36.9%), stomach (1.6%) and intestine (0.8%) were the locations infected and the skin supported the highest burden. The result also revealed that there were no significant differences between the size/age (X^2=0.44; p>0.05)and sex (X^2=1.38; p>0.05) and the degree of parasitic infection in this group of fishes. The economic and public health implications of these results in relation to fish-man interactions were discussed.

INTRODUCTION

Fishes are important sources of income and food in Nigeria and other countries in the sub-Saharan Africa, where about 35million people depend solely or partly on the fisheries sector for their livelihood (Ekanem *et al.,* 2011). In Nigeria, consumption and demand for fish protein is increasing due to its affordability and relatively high nutrient contents. However, fish production has been reportedly low to meet the demand of ever increasing human population due to many factors among which is the diseases caused by parasites (Omoniyi and Olofintoye, 2001; Olofintoye, 2006). The health of fish is affected by parasites which make it susceptible to secondary infection by disease causing organisms (e.g. bacteria, fungi and viruses). Not only this, parasites compete for food thereby depriving the fish of essential nutrients and inhibiting the growth which could lead to morbidity and mostly with consequent economic loss (Olurin *et al.,* 2012).

Though, parasites play an important role in the ecology of aquatic ecosystems, including aquaculture, their effects on the nutritive devaluation of fish and subsequent economic

losses have been reported (Onyedineke *et al.,* 2010).

Several studies have revealed rich parasitic fauna in freshwater fishes among which are (Ugwuzor, 1987; Onwuliri and Mgbemena, 1987; Auta *et al.,* 1999; Emere, 2000; Omoniyi and Olofintoye, 2001; Oniye *et al.,* 2004; Biu and Nkechi, 2013). These reports revealed that fish health, growth and survival were negatively affected in the water bodies.

It has also been reported that fish culture could provide a large reservoir of parasitic pathogens common to both wild and cultured fishes (Bichi and Ibrahim, 2009), but up till present no epidemic has been reported in Nigeria.

However, the Nigerian freshwater bodies need to be assessed and monitored for parasitic infections as culture of fishes is becoming more intensive and widespread and the consumption of these parasites could pose a serious health challenge to the consumers. It is on this perspective that this study was carried out to assess the parasites of Cichlid fishes in the Federal University of Agriculture, Abeokuta (FUNAAB) Water Reservoir to provide additional information on parasites of fishes in Nigerian freshwater bodies.

MATERIALS AND METHODS

The study area

The Federal University of Agriculture, Abeokuta (FUNAAB) Reservoir is located at the Fisheries section of the University Teaching Research farm. The 3-hectare reservoir was constructed by damning a seasonal stream (Alabata stream) in 1997. Alabata lies within the South Western region of Nigeria, within latitude 7^{0}10'N and longitude 3^{0}2'E, with a prevailing tropical climate and annual rainfall of about 1037mm. The ambient temperature lies within 28^{0}C in June and 36^{0}C in February with an average temperature of 34^{0}C. The vegetation presents an interphase between a tropical rainforest and a derived savannah. The reservoir is to provide water for other earthen ponds downstream, serve as fishing ground and for research and teaching purposes. The dominant families of fish found in the reservoir include Clariidae. Cichlidae, Bagridae, Hepesetidae, Cyprinidae and Centropomidae. *Macrobrachium* species also exists in the lake (Adeosun *et al.,* 2013).

Sampling procedure

Fish were captured in the morning between 9.00am and 11.00am using cast net of mesh size 5cm (2 fingers) and thickness of 210^D/9. The fishes were attracted with poultry droppings collected from the poultry section of the University Research farm. The captured fish were sorted out and the tilapine group were transported alive to the wet laboratory of the Department of Aquaculture and Fisheries Management.

Laboratory procedure

In the laboratory, each specimen was identified and given an identification number. All the tilapias were sorted into taxonomic categories and each specimen was subjected to laboratory measurements. The total and standard length of each specimen were measured with a measuring board to the nearest centimetre (cm) while the body weight in gramme (g) were measured using a top loading Mettler electronic balance of Model DT 1000. The sexes of the fish were determined by internal examination of testes and ovaries.

Collection and preservation of parasites

In the laboratory, fish were individually examined for parasites. The skin, gill and buccal cavity were examined with hand lens (magnification x 15) for the occurrence of any ectoparasite. Subsequently, the specimens were each dissected and different portions of the gut (oesophagus, stomach and intestine) were placed in saline solution which was isotonic to the endoparasites physiological medium; which aided the natural movement of the Helminths out of the different locations. Extraction of parasites was done with the aid of forceps.The parasites collected were counted and preserved in specimen bottles containing formalceticacid for subsequent identification. The specimen bottles were labelled with the date, location and name of host.

Identification of parasites

The parasites recovered were mounted on slides, viewed under the microscope (Model G300 series) and drawn out for identification. Identification of parasites was done according to Khalil and Polling (1997); Ugwuzor (1987); Edoh *et al.,* (2008).

Statistical analysis

The relationship that existed 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 and Torrie, 1980).The percent incidence of both ecto- and endoparasite were calculated according to Tombi and Bilong (2004).

Percentage incidence (%) = (n/N) x 100
Where, n is the number of individual parasites species isolated, N is the total numbers of parasites isolated from individual fish.

RESULTS

A total of 150 specimens of tilapine fishes from the reservoir were examined. The four species identified were *Sarotherodon galilaeus, Oreochromis niloticus, Hemichromis fasciatus*and *Tilapia zillii.* 34.7% of the specimens were male given a sex ratio of male to female 1:2. Of the total specimens examined, twenty-four (16.0%) were infected by parasites. The number of fish infected with their percentage infection is shown in Table 1. *Oreochromis niloticus* had the highest level of parasitic infection (29.0%) while *Tilapia zilli*was least infected (10.5%). A total of one hundred and twenty-two parasites belonging to four phyla; Phylum Protozoa (Class: Zoomastigophora), Phylum Annelida (Class: Hirudinea), Phylum Aschelminthes (Class: Nematoda) and Phylum Platyhelminthes (Class: Cestoda) were recovered from the skin, gills, intestine and stomach. No parasite was recovered from the buccal cavity and Oesophagus as revealed in Table 2. Table 3 reveals the percentage incidence of parasites recovered from the cichlid fishes from the reservoir. One hundred and twenty four parasites were recovered out of which one hundred and twenty one (97.6%) were ectoparasites found on the skin and gills. 96% of those ecto parasites were flagellate protozoans of*Ichthyobodonecatrix* and annelids of *Pisciola sp* which constituted 1.6% found on the skin only. Three (2.4%) were endoparasites found in the stomach (1.6%) and intestine (0.8%). These were made up of nematodes (*Cucullanus sp*) which constituted 1.6% found in the stomach only and 0.8%, cestodes (*Caryophyllaeides sp*) found in the intestine.

Table 1: Fish species examined and incidence of infection

Fish species	Number Examined	Number Infected	% Infection
Sarotherodongalilaeus	56	8	14.3
Oreochromis niloticus	31	9	29.0
Tilapia zilli	57	6	10.5
Hemichromisfasciatus	6	1	16.7
Total	150	24	16.0

Table 2: Number of parasites recovered and location of recovery in fish

Fish Species	No. of Hosts	No. Infect-ed	Ecto-parasites			Endo-parasites		
			S	G	B	O	I	St
Sarotherodongalilaeus	56	8	21	18	-	-	-	-
Oreochromis niloticus	31	9	49	20	-	-	-	-
Tilapia zilli	57	6	4	7	-	-	1	-
Hemichromisfasciatus	6	1	-	-	-	-	-	2
Total	150	24	74	45	-	-	1	2
% Infection		16.0	60.7	36.9	0	0	0.8	1.6

S – Skin G – Gill B – Buccal cavity O – Oesophagus I – Intestine
St - Stomach

Table 3: Incidence of parasites among fish hosts

Parasite	Class	% Infection	Fish species infected	No. of parasites
Ecto-parasites				
Ichthyobodonecatrix	*Zoomastigophora*	96.0	*Sarotherodon galilaeus*	39
			Oreochromis niloticus	69
			Tilapia zilli	11
Piscicola sp.	*Hirudinea*	1.6	*Oreochromis niloticus*	2
Endo-parasites				
Cucullanus sp.	*Nematode*	1.6	*Hemichromis fasciatus*	2
Caryophyllaeides sp.	*Cestode*	0.8	*Tilapia zilli*	1

Table 4 presents the relationship between fish age/size and the incidence of infection using the frequency distribution table. Out of the 150 fishes examined, 69.3% were pre -adults while 10% were juveniles. In relation to size of fish as indicated in Table 5, it was observed that pre-adults were infected most. 20.8% of the male and 13.4% of female specimens were infected as shown in Table 5. There was no significant difference between male and females with regards to incidence of infection (X^2=1.38: p>0.05). Also, the size/age of fish sampled did not influence the degree of infection (X^2=0.44: p>0.05).

Table 4: Relationship between host age/size and incidence of infection

Age group	Range of Standard length (cm)	No. Examined	No. Infected	% Infection
Juvenile	5.0-9.9	15	2	1.33
Pre-Adult	10.0-14.9	104	18	12.0
Adult	15.0-19.9	31	4	2.67
		150	24	16.0

Table 5: Relationship between sex of host and incidence of infection

	Males			**Females**		
Host species	**No. Examined**	**No. Infected**	**% Infection**	**No. Examined**	**No. Infected**	**% Infection**
Sarotherodongalilaeus	7	-	0.0	49	8	16.3
Oreochromis niloticus	17	6	35.3	14	3	21.4
Tilapia zilli	25	4	16.0	32	2	6.3
Hemichromisfasciatus	4	1	25.0	2	-	0.0
Total	53	11	20.8	97	13	13.4

DISCUSSION

The overall prevalence rate of 16.0% of parasites observed in the current study was low compared to the observation of 48.4% and 60.23% prevalence of infection by Omoniyi and Olofintoye (2001) and Olofintoye (2006) in Water Reservoir and Elemi-river in Ado-Ekiti respectively. In same vein, findings of Morenikeji and Adepeju (2009) in Eleyele dam in Ibadan, South western Nigeria and Onyedineke*et al.,*(2010) in river Niger at Ilushi in Edo State reported similar low prevalence rate results. However, a much lower infection rate of 7.7% from Imo river was reported by Ugwuzor (1987). Infection incidence therefore, seemed to vary greatly from one locality to the other due to factors of endemicity, availability of intermediate hosts and susceptibility of host to infection (Chandler and Read, 1981). The low infestation rate in these fishes could be attributed to the sanitary condition of the riv-

er, the location of the river from residential areas, number and class of people visiting the river and their purposes.

This study revealed the occurrence of four groups of parasites infecting cichlids in FUNAAB reservoir. The protozoan, *Ichthyobodo necatrix* found mainly on the skin and gills accounted for a larger (95.9%) percentage of the total parasites recovered; this might be attributed to the direct life cycles of protozoans or the fact that the gills are in great contact with the external water surrounding as a result of their respiratory activities (Robert 1978).

Another form of ectoparasite found on the skin was the *Piscicola sp.* The low prevalence rate (1.6%)of this annelid could be due to the migratory act of leech which only derives its nourishment when the need arises using both its anterior and posterior suckers as reported by (Robert 1978) Bichi and Ibrahim (2009). This parasite was observed not to be host specific as indicated in (Omoniyi and Olofintoye, 2001); both cestodes and nematodes (helminthes) recovered accounted for only 2.4% of the infection in the fish samples.

The differences in the prevalence of infection between males and females have been observed by previous scientists (Ugwuzor, 1987). Infection was significantly high in females than in males in the study which could be due to the difference of their physiological condition of the females especially gravid ones (Ugwuzor 1987; Omoniyi and Olofintoye, 2001). This observation in this study seemed to be due to the more foraging habit of the males than the females, resulting in a higher exposure to infection; also, reproductive hormonal level in females may increase resistance to infection (Ekanem *et al.,* 2000).

Juveniles' fish were less infected than adult. This could be attributed to accumulation of parasites year by year as explained by Nwaba *et al.* (1999). The differences in prevalence of infection between the juveniles and the adults as related to their length and weight might be due to changes in their diet from weeds, seeds, phytoplankton and zooplankton to insect larvae crustaceans and worm in both juveniles and adult respectively (Reed *et al.,* 1987).

In conclusion, although low incidence of parasite infection was recorded, the infection rate was significantly enough to elicit some pathological effects on fishes by retarding their growth, cause death and a reduction in market values. Therefore, it is suggested that, harvested fish from this location should be properly cooked to avoid ingestion of parasites by fish consumers. Also, more studies especially on the life cycles of these parasites in the reservoir should be carried out to improve the fish quality

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