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ISOLATION, IDENTIFICATION AND PREVALENCE OF PARASITES ON OREOCHROMIS NILOTICUS FROM THREE SELECTED RIVER SYSTEMS

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ABSTRACT

The prevalence of protozoan and helminthic parasite species occurring on and in the internal organs of Oreochromis niloticus were studied. Twenty samples of a mixture of adult and juvenile individuals of Oreochromis niloticus were randomly obtained from fishermen landing at the jetties of Epe water side, Ikorodu (Odoguyan) river and a brackish water (makoko), between September and October, 2009, during a period of low rainfall. Samples were eviscerated and the parasites were excised, identified and each species of parasites was counted. Most of the parasites encountered were of the Protozoa, manogenea, Digenea, Cestoda and Nematoda groups. The infestation was predominantly by Nematoda species and followed by protozoan species. Protozoan parasites like Trichodina sp and Ichtyobodo sp were found to be prevalent, in varying magnitude, in most of the fish samples without clear age discrimination. The study reveals that the prevalence of parasites infestation increases with increasing length, size and age of the fish host and different parts of the fish.

Keywords: parasite, identification, fish selected river, Lagos.

INTRODUCTION

Fish is a food consumed by many species, including humans, the word fish refers to both the animal and to the food prepared from it. Three quarter of the earth surface is covered by water, so fish has been an important part of the diets of human in almost all continents of the world. Fish is a cheap and important source of protein; it contains lipids, minerals and vitamins. Fish occupies several different levels of the aquatic food chain and makes up more than 40% of the world vertebrate species. Fish interacts with the various levels of food chain and influence the structures of lakes, streams and estuaries, since they are usually restricted to a particular mode of life related to their food source and reproductive requirement.

Many fish species have been found to harbour protozoan and plenty of helminth parasites on their skin and /or under their scales. (George, 2002). Parasitology has always been a discipline in which purely academic studies of the evolution of parasites and their life-cycles have progressed as a necessary complement to the study of the pathology and, control of the major tropical diseases of human and their livestock.

Indeed, the most striking feature of parasitology is the diversity of parasites in the warm tropical regions of the world and the frightening levels of debilitation and misery they cause. Similarly, the study of parasite population dynamics has

developed within a solid theoretical framework (Anderson and May, 1979). Fish parasites have logically received greatest attention in past researches. Parasites are organism that inhabit, at sometime during their life-cycle, the body of another larger animal, thereby causing various diseases (George, 2002). Fishes, like other animals are exposed and susceptible to a wide range of microbial infections. These microbial infections are caused by organisms which are referred to as parasites. Fish parasites could be as a result of density of stocking, poor condition of farming, lack of proper husbandry and stress (George, 2002). This study would serve as baseline data for further research works that have to do with the distribution of fish parasites from these rivers and water bodies.

MATERIALS AND METHODS

Three water bodies in Lagos were chosen for the collection of adult and juvenile samples of the Oreochromis niloticus for the isolation and identification of parasites found on them and within their organs.

The three water bodies are Epe water site (a brackish water), Ikorodu (a fresh water) areas of Lagos State that are connected by the Ogun river as well as the network of Lagos Lagoons.

Sample Collection

Twenty samples of a mixture of adult and juvenile individuals of Oreochromis niloticus were obtained weekly for six weeks from fishermen landing at the jetties of these towns already identified. Sample collections and immediate excision of parasites were carried out in between weeks of September and October, 2009, during a period of low rainfall.

Materials

Light microscope, dissecting kit, a pair of scissors, wash-glass, petri-dishes, glass

slides, coverslips, pant brush, saline water, alcohol, formation acetic acid solution and wright-Griemsa stain.

Methodology

Isolation and identification of parasites- protozoa, monogenea, digenea, cestoda and nematode, from fish was done as described by Roberts (1978).

RESULT

TABLE 1: Prevalence of Parasite species found on *Oreochromis niloticus* (Week 1)

CLASS	EPE Count	%	IKORODU Count	%	MAKOKO Count	%	OVERALL TOTAL Count	%
<u>PROTOZOA</u>	0	0	1	2.9	1	2	2	1.9
chilodonella sp.								
Ichtyophthirius multifiliis	1	4.4	1	2.9	1	2	3	2.8
Trichodina sp.	2	8.7	7	20.6	15	29.4	24	22.2
Epistylis sp.	2	8.7	1	2.9	1	2	4	3.7
Ichtyobodo sp. (Costia)	1	4.4	2	5.8	3	5.9	6	5.6
<u>MONOGENEA</u>				2.9	2	3.9	3	2.8
Gyrodactylus	0	0	1					
Macrogyrodactylus sp.	0	0	0	0	0	0	0	0.0
Dactylogyrus sp.	1	4.4	2	5.8	3	5.9		
<u>DIGENEA</u>							6	5.6
Clinostomum								
Marginatum	3	13	1	2.9	0	0		
Heterophyes sp.	0	0	0	0	0	0	4	3.7
<u>CESTODA</u>				0	0	0	0	0.0
Diphylobothrium latum	0	0	0					
Bothricepholus sp.	1	4.4	3	8.8	5	9.8	0	0.0
<u>NEMATODES</u>				2.9	1	2	9	8.3
Camallanus sp.	4	17.4	1					
Capillaria sp.	3	13	8	23.5	10	19.6	6	5.6
Eustrongyloides sp.	1	4.4	1	2.9	1	2	21	19.4
Trichuris sp.	0	0	0	0	0	0	3	2.8
Philometra sp.	0	0	0	0	0	0	0	0.0
Contracaecum sp.	4	17.4	5	14.7	8	15.7	0	0.0
TOTAL	23	100	34	100	151	100	108	100
RELATIVE PERCENTAGE	21.9		31.5		47.2		100	

RESULTS

TABLE 2: Prevalence of Parasite species found on *Oreochromis niloticus* (Week 2)

CLASS	EPE		IKORODU		MAKOKO		OVERALL TOTAL	
	Count	%	Count	%	Count	%	Count	%
<u>PROTOZOA</u>								
Chilodonella sp.	1	4.5	1	2.8	0	0	2	1.8
Ichtyophthirius multifiliis	1	4.5	1	2.8	1	1.9	3	2.7
Trichodina sp.	5	22.7	15	41.7	20	37.7	40	36
Epistylis sp.	1	4.5	1	2.8	1	1.9	3	2.7
Ichtyobodo sp. (Costia)	1	4.5	1	2.8	1	1.9	3	2.7
<u>MONOGENEA</u>								
Gyrodactylus	0	0	2	5.5	4	7.6	6	5.4
Macrogyrodactylus sp.	0	0	0	0	0	0	0	0.0
Dactylogyrus sp.	1	4.5	1	2.8	1	1.9	3	2.7
<u>DIGENEA</u>								
Clinostomum Marginatum	3	13.6	1	2.8	1	1.9	5	4.5
Heterophyes sp.	0	0	0	0	0	0	0	0.0
<u>CESTODA</u>								
Diphylobothrium latum	0	0	0	0	0	0	0	0.0
Bothricephalus sp.	1	4.5	1	2.8	2	3.8	4	3.6
<u>NEMATODES</u>								
Camallanus sp.	1	4.5	2	5.5	4	7.6	7	6.3
Capillaria sp.	5	22.7	8	22.2	15	28.3	28	25.2
Eustrongyloides sp.	1	4.5	1	2.8	1	1.9	3	2.7
Trichuris sp.	0	0	0	0	0	0	0	0.0
Philometra sp.	0	0	0	0	0	0	0	0.0
Contracaecum sp.	1	4.5	1	2.8	2	3.8	4	3.6
TOTAL	22	100	36	100	53	100	111	100
RELATIVE PERCENTAGE	19.8		32.4		47.8			

RESULTS

TABLE 3: Prevalence of Parasite species found on *Oreochromis niloticus* (Week 3)

CLASS	EPE		IKORODU		MAKOKO		OVERALL TOTAL	
	Count	%	Count	%	Count	%	Count	%
<u>PROTOZOA</u>								
Chilodonella sp.	1	4.2	1	3.1	1	2.0	3	2.7
Ichtyophthirius multifiliis	0	0	1	3.1	3	6	4	3.6
Trichodina sp.	5	20.8	8	25	12	24	25	22.7
Epistylis sp.	1	4.2	1	3.1	1	2	3	2.7
Ichtyobodo sp. (Costia)	0	0	1	3.1	1	2	2	1.8
<u>MONOGENEA</u>								
Gyrodactylus	1	4.2	1	3.1	2	4	4	3.6
Macrogyrodactylus sp.	0	0	0	0	0	0	0	0.0
Dactylogyrus sp.	1	4.2	1	3.1	2	4	4	3.6
<u>DIGENEA</u>								
Clinostomum Marginatum	3	12.5	1	3.1	0	0	4	3.6
Heterophyes sp.	0	0	0	0	0	0	0	0.0
<u>CESTODA</u>								
Diphylobothrium latum	0	0	0	0	0	0	0	0.0
Bothricephalus sp.	1	4.2	2	6.3	4	8	7	6.4
<u>NEMATODES</u>								
Camallanus sp.	1	4.2	2	6.3	4	8	7	6.4
Capillaria sp.	4	16.7	7	21.9	10	20	21	19.1
Eustrongyloides sp.	1	4.2	0	0	2	4	3	2.7
Trichuris sp.	0	0	0	0	0	0	0	0.0
Philometra sp.	0	0	0	0	0	0	0	0.0
Contracaecum sp.	5	20.8	6	18.8	8	16	19	17.3
TOTAL	24	100	32	100	50	100	110	100
RELATIVE PERCENTAGE	21.8		29.1		45.5			

RESULTSTABLE 4: Prevalence of Parasite species found on *Oreochromis niloticus*_ (Week 4)

CLASS	EPE		IKORODU		MAKOKO		OVERALL TOTAL	
	Count	%	Count	%	Count	%	Count	%
<u>PROTOZOA</u>		2.9	1	2.2	1	1.9	3	2.2
Chilodonella sp.	1							
Ichtyophthirius multifiliis	1	2.9	0	0	1	1.9	2	1.5
Trichodina sp.	10	28.6	25	55.6	20	37	55	41
Epistylis sp.	0	0	1	2.2	1	1.9	2	1.5
Ichtyobodo sp. (Costia)	1	2.9	1	2.2	1	1.9	3	2.2
<u>MONOGENEA</u>		2.9	1	2.2	0	0	2	1.5
Gyrodactylus	1							
Macrogyrodactylus sp.	0	0	0	0	2	3.7	2	1.5
Dactylogyrus sp.	1	2.9	1	2.2	1	1.9	3	2.2
<u>DIGENEA</u>		2.9	0	0	1	1.9	2	1.5
Clinostomum Marginatum	1							
Heterophyes sp.	0	0	0	0	0	0	0	0
<u>CESTODA</u>		0	0	0	0	0	0	0
Diphylobothrium latum	0							
Bothricephalus sp.	1	2.9	2	4.4	4	7.4	7	5.2
<u>NEMATODES</u>		2.9	1	2.2	1	1.9	3	2.2
Camallanus sp.	1							
Capillaria sp.	10	28.6	5	11.1	12	22.2	27	20
Eustrongyloides sp.	2	5.7	1	2.2	1	1.9	4	3.0
Trichuris sp.	0	0	0	0	0	0	0	0
Philometra sp.	0	0	0	0	0	0	0	0
Contracaecum sp.	5	14.3	6	13.3	8	14.8	19	14.2
TOTAL	35	100	45	100	54	100	134	100
RELATIVE PERCENTAGE	26.1		33.6		40.3			

TABLE 5a: COMPARISON OF DEGREE OF PARASITIC INFESTATION
AMONG THE THREE WATER BODIES

PERIOD		EPE	IKORODU	MAKOKO	SEM
WEEK 1	} Sept.2009	23 ^c	34 ^b	51 ^a	1.27
WEEK 2		22 ^c	36 ^b	53 ^a	1.29
WEEK 3	} Oct.2009	24 ^c	32 ^b	50 ^a	1.20
WEEK 4		35 ^c	45 ^b	54 ^a	0.97

TABLE 5b: VALUES ON TABLE 5a IN PERCENTAGES

PERIOD		EPE	IKORODU	MAKOKO	SEM
WEEK 1	} Sept.2009	21.9 ^c	31.5 ^b	47.2 ^a	0.78
WEEK 2		19.8 ^c	32.4 ^b	47.8 ^a	0.81
WEEK 3	} Oct.2009	21.8 ^c	29.1 ^b	45.5 ^a	0.69
WEEK 4		26.1 ^c	33.6 ^b	40.3 ^a	0.32

Table 5a and 5b reveal that brackish water was more infested with parasitic organisms than the freshwater bodies this can be attributed to the fact there is a denser population around the Makoko water body, relative to those of the two other locations (Epe and Ikorodu), besides, brackish water bodies suffer more from pollution than fresh water bodies, especially where the brackish water is surrounded by a dense population, this is similar to the observation of Osineye et al (2009).

TABLE 6a: COMPARISON OF DEGREES OF PARASITIC INFESTATION AMONG THE FOUR PERIOD OF STUDY

WATER BODIES	WEEK 1	WEEK 2	WEEK 3	WEEK 4	SEM
EPE	23 ^b	22 ^b	24 ^b	35 ^a	0.21
IKORODU	34 ^b	36 ^b	32 ^b	45 ^a	0.10
MAKOKO	51 ^a	53 ^a	50 ^a	54 ^a	0.01

TABLE 6b: VALUES ON TABLE 6a IN PERCENTAGES

WATER BODIES	WEEK 1	WEEK 2	WEEK 3	WEEK 4	SEM
EPE	21.9 ^b	19.8 ^b	21.8 ^b	26.1 ^a	0.01
IKORODU	31.5 ^b	32.4 ^a	29.1 ^b	33.6 ^a	0.03
MAKOKO	47.2 ^a	47.8 ^a	45.5 ^a	40.3 ^b	0.05

Table 6a & b reveal that parasitic infestation of water bodies increases with advancing dry season – rainfall does a lot of cleansing to water bodies. Volumes of waters decrease with advancing dry season, thus increasing the population of parasitic organisms per unit volume of water, as recorded by Osineye et al (2009).

DISCUSSION

The essence of constant surveillance of food-borne parasites and their epidemiological distribution can never be over emphasized in developing countries such as Nigeria. This is more so when literacy level and awareness of basic hygiene and methods of limiting the spread of these food-borne parasites are low. Fish remains one of the most highly sought after food items in many Nigerian dishes. It then remains very important that epidemiological surveys of the parasites borne by many of the popular fish species in our markets and landing sites, as arranged by the choice of Epe water-side, Ikorodu and Makoko, be adequately studied and well documented. It is therefore a shortcoming that fish is not included in food items and living organisms that are quarantined and adequately monitor across border. This study is very important first step towards proper wild fish stock management and the control of many of the human diseases caused by some of the fish borne disease causing agents.

This study showed a preponderance of some protozoan parasites for a given tilapia species host at some sampling location than for others.

The study showed that Trichodina Sp was very prevalent and abundant, all the tilapia species bore Trichodina sp at all the locations throughout the study period. While there is no categorical evidence that Trichodina do not cause any humanly known disease, the fact, that their method of attacking fish host skin and causing dermal erosion may indicate other kind of secondary impacting pathogens that may predispose man to novel diseases. This is in clear agreement with previous studies carried out by Abaladejo and Arthur (1989).

According to Paperna (1980) the cichlids, harbour majority of the infection which include the adult digenea infecting different tissues of the body; trematode metacercaria of the family clinostomidae encysting in tissue; and adult monogenea of

the families, Dactylogridae and Gyrodactylidae infecting the gills and the skin, a similar observation was made in this study, where trematodes were located in the gills and skin of tilapia species. Kabaya (1985) and Paperna (1996) also reported excessive mucus secretion, epithelial proliferation and dermal erosion of fin fish association with the pathology of gyrodactylus sp.

This shows that it could be easy to identify fish samples with compromised dermal tissues that may bear Gyrodactylus sp and avoid them during market purchases in order to prevent human transmission of possible infection.

Clinostomum marginatum, Bothriocephalus sp, Camallanus sp, capillaria sp, Enstrongylides sp and contracaecum sp were found parasitizing Oreochromis niloticus, this observation agrees with the findings of Paperna (1980), Awachire (1966).

Nematode parasites were found in the intestines of the fish host as earlier observed by Okaka and Omoigberale (2002), who record nematode as the most common parasites infecting 18.6% of the fish population.

During this study, it was also observed that adult fishes have more susceptibility to parasitic infections than juveniles and this corroborates the finding of Torres et al (1979) who reported that the longer and bigger the fish, the greater the susceptibility to parasitic infections.

RECOMMENDATION

It is recommended that this study be continued and widened for greater number of fish species as are found in many Nigerian diets. For the control of parasites in fish culture system, the following recommendations are made:-

- ❖ The lining of ponds with slaked lime, (for areas that have acidic condition), before stocking.
- ❖ Early detection of signs of parasitic problems by constant surveillance and observation of

- the behaviour in rivers and reservoirs.
- ❖ Removal of weeds and various types of vegetation to ensure that parasites such as leches and snails (intermediate hosts) of digenean flukes are kept under control
  - ❖ Training of competent scientists to manage all commercial fish farms and reservoirs.
  - ❖ The control of fish density, selective cropping and prompt removal of infected fish to avoid rapid spread to other fishes.

CONCLUSION

The economic impact of these parasites on fish as an article of trade from our inland and coastal waters in comparison to their endemic nature in fish culture system would lead to better policy decision on how to protect Nigeria's aquatic resources. This all the more important when one considers the expected hostile reactions of European countries to the important fish and fish products from Nigeria based on heavy parasitic infestation in the absence of any scientific study quantifying and controlling it. Therefore, the ultimate solution to most of these problems lies in "prevention is better than cure". A total and comprehensive knowledge of the biology of host-parasite relationship within the culture system is therefore imperative.

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