

IJBHS 2008053/4302

A preliminary study of parasitic infections of some fishes from Okhuo River, Benin City, Nigeria.

C. U. Edema, C. E. Okaka*, I. P. Oboh and B. O. Okogub

Department of Animal and Environmental Biology, University of Benin, Benin City, Nigeria.

(Received August 15, 2008)

ABSTRACT: A survey of fishes of the Okhuo River was conducted between August and November 2004 to determine the fish types, abundance and prevalence of parasitic infection. The fish were collected with gill nets and with hook and line. Ten fish species in nine genera and six families were encountered. The family Cichlidae formed 44.44% of the total number of individuals while the rest were Notopteridae, Characidae, Malapteruridae, Channidae and Anabantidae. Nematode parasites were only recorded. Two nematode parasite species *Procamallanus* sp (50% prevalence) and *Cucullanus barbi* of 33.3% prevalence were observed in the intestine of *Chromiclotiapia guentheri*. *Spinitectus* sp had 16.7% prevalence in *Parachanna obscura*. The overall parasitic infection rate was 6.94%.

Keywords: Parasitic infection; Fishes; Okhuo River; Benin City; Nigeria.

Introduction

Fishes are important to man as a good source of protein in man's diet and as a vector of some human disease pathogens. One of the scientific importance of identifying a fish properly is to tell to some reliable extent the health condition of the fish, and certain parasitic infections present with some symptoms that bear on the external treatment of the fish. All species of fish are vulnerable to various parasitic infections depending on the species of fish and the type of stream inhabited.

Some of the factors that enhance parasitic infection in fishes include reduced oxygen content of water, increase in organic matter, in the water, poor environmental conditions.

A wide range of parasitic infections of inland freshwater fishes have been studied from various parts of the world. The importance of such parasitic infections particularly with respect to huge economic loss in fishes has also been well studied. In the United Kingdom, Kennedy (1974), Chappel and Owen (1969) have documented a checklist of the parasites of freshwater fishes in the British Isles and various other reports (e.g Arme and Owen 1967, 1968; Okaka 1984), also exist on intensities, prevalence and epidemiology of infestations of these parasites in the fish hosts.

*To whom correspondence should be addressed.

In Africa, a checklist of helminth parasites of freshwater fishes has been published by Khalil (1971) and various reports also exist from different parts (countries) of Africa, highlighting on intensities, prevalence, epidemiology and pathology of such parasitic infections. 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 Pousopothocotylidae, Dactylogridae and Gyrodactylidae infecting the gills and Skin. However another reported that cichlidae infections with adult trematodes were rare. According to him also, the adults and larvae of cestodes, nematodes and the acanthocephalans occurs in the intestine.

The cestodes and nematodes are reported to interfere with the absorption of nutrients in the intestine of the fish and may reduce food intake. The metabolites produced by some of these parasites could adversely affect vital systems of the fish (Ukoli 1988). The pathology effects of intension with acanthocephalenses from the abrasions and lesions caused by the proboscis during attachment and may be accompanied by second bacterial infections.

In Nigeria there have been reports of parasitic infections in freshwater fishes from some locations. Awachie (1965) found acanthocephan mostly *Rhadiriorhynchus horridus* and the trematode *Euchinostomum* in fishes from River Niger. Ukoli (1966, 1969) observed the medecarianae on *Chinostomum tiapiaie*, *C. complanatum*, *Nephrocaphaius sessile*, *Euchinostomum heterostomus* and *E. clarias* in cysts isolated from the tissues of fish from River Niger.

In Edo State, although there are reports from Okhuaihe river (Awharitoma and Okaka, 1999) and Osse River (Okaka and Akhigbe, 1999; Okaka and Omoigberale, 2002). There are still some streams and rivers that have not been investigated. Therefore this study is designed to determine the different kinds of fish found in Okhuo river, giving them morphological description and attempt a preliminary investigation of the parasitic infections of fish in this river.

Materials and Methods

(a) STUDY AREA

The River Okhuo runs along the northern journey of the Nigerian Institute for Oil Palm Research located at 24.0km Northwest of Benin City between co-ordinate 06°33'N and 05°37'E.

The river runs through a rainforest with shrubs and trees along the bank. Human activities include micro-artisanal fishing. Up hill at Okodobo village, human activities are discouraged as the water is useful for domestic purposes. At the water pump location, there were no overhanging trees. During a recent study (Edema *et al*, 2002), observed that air temperature (mean = 25.9°C) was slightly higher than water temperature (mean 25.8°C). The pH (mean = 5.63), alkalinity (mean=8.95mg l⁻¹) and biochemical oxygen demand (mean = 2.94mg l⁻¹) were low. Dissolved oxygen (mean =111mg l⁻¹) and conductivity (mean=29 1 .4μS cm⁻¹) were high.

High dissolved oxygen and low BOD values indicate low levels of organic matter in the water. The midge (Chironomid) larvae bioindicators of pollution were only 8.1% of the insects. The predominance (67.2%) of may fly Ephemeroptera used as a clean water indicator portrayed the river to be well oxygenated.

(b) Collection and study of fish specimen

Fishes were purchased from a hired fisherman (from August to November 2004) who used gill nets of 5.08cm and 7.6 1cm stretched mesh sizes, hooks and lines. They were transported to the laboratory in a plastic container. All fish samples were examined in the same day without prior preservation.

Identification of Fish

In the laboratory, the fishes were identified with standard taxonomic work (Olaosebikan and Raji 1998, Idodo Umeh 2003).

Measurement of fish for morphological description.

The standard length (SL). Body depth (BD) were taken by means of meter rule. The weight of the fish were measured to the nearest gram using an electronic balance.

(c) Examination of fish for parasites

Each fish was dissected from the anus, and the intestine including the stomach was opened up by means of a pair of dissecting scissors and placed in a Petri dish. Parasites were picked by means of a Pasteur pipette and placed in a specimen bottle containing 5.0% alcohol as preservative. The number of parasites per fish and site of infection were noted. The same procedure was used in examining the gills and the internal tissues.

(d) Identification of parasites

The parasites recovered were first removed from the preservative, washed with water, and placed on a clean slide. A few drops of lactophenol were added and the slide was viewed under the microscope. Drawing of the parasites were made and identification done using appropriate keys (Yagamuti, 1961).

Results

The 72 fish specimens examined during the study belong to ten species, nine genera and six families. The family cichlidae was represented by four species which comprised 44.44% of the total number of individuals. Characidae was represented by two species and accounted for only 6.94% of the total number of individuals. The remaining four families (Notopteridae, Malapteruridae, Channidae and Anabantidae) were represented by a species each. The list of fishes, number and percentage (Table 1), which shows some morphometric parameters considered. In *Papynocranus afer*, *Parachanna obscura* and *Hemichromis fasciatus* the body depth is shorter than the head- length, while in *Brycinus longipinnis*, *B. nurse*, *Malapterurus electricus*, *Oreochromis aureus*, *Tilapia mariae* and *Ctenopoma kingsleyae*, the body depth is greater than the head length.

Result on Parasite Infection

Of the 72 fish specimens examined, only 5 (6.94%) were found to be infected with parasites. The parasites encountered were all nematode parasites, namely *Procamallanus sp* which represented 50% prevalence, *Cucullanus barbi* (33.3%) and *Spinitectus sp* (16.7%) prevalence. *Procamallanus sp* and *Cucullanus barbi* were recovered from four out of the ten specimens (40%) *Chromidotilapia guentheri* examined. *Spinitectus sp* was recovered from one of ten (10%) *Parachanna obscura* specimen examined. All the parasites were recovered from the intestine of their hosts. Table 2 shows the summary of the number of fishes examined, their percentage parasitic infection and the parasite found.

Table 1: Some morphometric measurements of ten fish

Fish Species	Parameters percent of SL				
	SL	BD%	HL%	Range	n
Notopteridae <i>Papynocranus afer</i>	29.76 ± 6.98	18.16	20.73	21.80-41.50	1 12(16.67%)
Characidae <i>Brycinus longipinnis</i>	7.95 ± 0.10	39.37	29.56	7.80-8.00	2 4(5.56%)
<i>Brycinus nurse</i>	22.20	32.88	23.42	.	1(1.39%)
Malapteruridae <i>Malapterurus eletricus</i> :	12.98 ± 2.0	22.42	21.96	10.70-16.00	1 8(11.11%)
Channidae <i>Parachanna obscura</i> :	18.75 ± 2.85	17.71	33.60	15.30-23.00	10(13.89%)
Cichlidae <i>Chromidotilapia guetheri</i> :	11.15 ± 0.79	39.72	39.20	10.00-12.50	1 10(13.89)
<i>Hemichromis fasciatus</i>	11.06 ± 1.00	37.79	38.70	9.20-13.00	12(16.67%)
<i>Oreochromis aureus</i>	10.90 ± 1.27	39.90	31.19	10.00-11.80	2(2.78)
<i>Tilapia mariae</i>	14.44 ± 1.18	45.70	31.93	13.00-16.60	8(11.11%)
Anabantidae <i>Ctenopoma kingsleyae</i>	10.70 ± 0.57	41.87	34.39	10.00-11.30	5(6.94%)

SL = Standard length, BD = Body depth, HL = Head length.

Table 2: Summary of fishes, no examined, percentage of infection and parasites found

Family	Fish species	No Examined	Infection (%)	Class	Family	Genus	Location
Notopteridae	<i>Papynocranus afer</i>	12	-	-	-	-	-
Characidae	<i>Brycinus longipinnis</i>	4	-	-	-	-	-
	<i>B. nurse</i>	1	1	-	-	-	-
Malapteruridae	<i>Malapterurus electricus</i>	8	-	-	-	-	-
Channidae	<i>Parachanna obscura</i>	10	1(10%)	Nematode	Rhabdonchondinae	<i>Spinitectus sp</i>	Intestine
Cichlidae	1. <i>chromidotilapia guentheri</i>	10	4(40%)	Nematode	Carnallanidae	<i>Procamallanus sp</i>	Intestine
	2. <i>Hemichromis fasciatus</i>	12	-	Nematode	Carnallanidae	<i>Cucullanus barbi</i>	-
	3. <i>Oreochrmis aureus</i>	2	-	-	-	-	-
	4. <i>Tilapia mariae</i>	8	-	-	-	-	-
Anabatidae	<i>Ctenopoma kingsleyae</i>	5	-	-	-	-	-

Discussion

This preliminary investigation of the parasitofauna of fish in Okhuo River presents 6.94% infection rate. This is rather very low as compared to other similar work such as those of Awharitoma and Okaka (1999) that recorded 60.8% infection rate for cichlide fishes from Okhuaihe River in Edo State. Others are Onwuliri and Mgbemena (1987), Umuoeren et al. (1988) who recorded 60.4% and 53.8% respectively. However Ugwuzor (1987) and Okaka (1991) obtained lower prevalence figures (7.7% and 16.5% respectively) in the fishes examined from Imo River and Asa River Ilorin, respectively. This shows that parasitic infection rates vary greatly from one area to another and this depends on a number of factors which include among other things, the nature of the water which is reflected in the human use and the endemicity of infection in the area.

A water body that is being used as a source of drinking water is likely to be a clean water, while that which serves a collecting basin for all kinds of waste (mainly organic waste) are usually unclean and thus capable of harbouring different kinds of organisms including parasites. In Okhuo River, proportion of biota (Ephemeroptera, 67.2%; Chironomidae, 8.1%) interplaying with the physico-chemical characteristics are conducive to cleanliness of the river (Edema et al., 2002). In the study 3 species of nematodes were recorded. These were *Procamallanus* sp. *Cucullanus barbi* and *Spinitectus* sp which were all found in the intestine of their hosts. Nematode parasites have been reported as having common incidence among freshwater fishes. Okaka and Omoigberale (2002) recorded nematodes as the most common parasite, infecting 18.6% of the fish population: trematodes infecting 13.7%; anthocephalans infecting 8.8%, and cestodes infecting 17.6% of the total fish population.

Okaka (1998) also reported that nematode parasites were found to infect most fish species studies at the Ikpoba River. The parasites reported in this study (*Procamallanus* sp. *Cucullanus barbi* and *Spinitectus* sp) have been reported not only in various parts of the country, but according to Khali (1971), have also been recorded in other African countries including Egypt, Ghana, Gabon, Sudan and Zambia.

It is not exactly known why other parasites apart from nematodes were not encountered. It is however important to mention that the incidence of parasites among fishes of this river is significantly low. The reason for this may be due to the apparent clean nature of the river, due to the increased speed of flow hence the river is used as the source of portable water by the community.

Sampling was done in rather one station (ie the vicinity of the water Reservoir). Other parts were not adequately sampled because of the thick overhanging vegetation which limits accessibility. This may also account for why there was low abundance of fish obtained and little or no variation in terms of the parasites found.

References

- Arme, C. and Owen, R.W. (1967). Infections of the three spined stickle back *Gasterosteus aculeatus* L. with the plerocercoid larvae of *Schistocephalus solidus* (Muller, 1977) with special reference to the pathological effects. *Parasitology*. 57: 301-314.
- Arme, C. and Owen, R.W. (1968). Occurrences and Pathology of *Ligula intestinalis* infections in British Fishes. *J. Parasit.* 54: 272-280.
- Awachie, J.B.E. (1965). Preliminary notes on the parasites of fish in the area of the Kainji reservoir, In: The First Scientific Report of the Kainji. Biological Research Team. (Ed. E. White) Liverpool Biological Research Team 65-69.
- Awharitoma, A.O and Okaka, C.E. (1999). Observation on the cichlid fishes in Ikpoba river and their parasitic infection. *The Nigerian Journal of Parasitology*. 20: 129-137.
- Chappel, L.H. and Owen, R.W. (1969). A reference list of parasite species recorded in freshwater fishes from Great Britain and Ireland. *J. of Nigeria History* 3:179-216.
- Edema, C.U. Ayelin, J.O. and Aruoture, A. (2002). Some observations on the. zooplankton and macrobenthos of the Okhuo River, *Nigeria journal of Aquatic sciences* 17 (2): 145-149.
- Idodo-Umeh, G. (2003). *Freshwater fishes of Nigeria; Taxonomy, Ecological notes, Diet and Utilization*. Idodo-Umeh publishers Limited, Benin City. 232pp.
- Kennedy, C.R (1974). A checklist of British and Irish freshwater fish parasites with notes on their distribution. *Journal of fish Biology* 6: 613-644.

- Khalil, L.F (1971). Checklist of the Helminth parasite of African Freshwater fishes. Common Wealth Agricultural Bureaux Technical Communication No. 42; 8Opp.
- Okaka, C.E. (1984). Studies on the biology of *Cyathocephalus truncates* (Pallas 1978) (Cestoda: Spathebothridea) in its fish and crustacean host. Ph.D Thesis, University of Leeds, U.K. 580pp.
- Okaka, C.E. (1991). A survey into Helminth parasites of fishes of Asa river and its dam at Ilorin, Nigeria. *Journal of Experimental and Applied Biology*. 3: 120-128.
- Okaka C.E (1998): Plerocercosis and other helminth infection among fresh water fishes of Osiomo and Benin rivers in Southern Nigiera. *Tropical Freshwater Biology* 7: 73-80.
- Okaka C.E and Akhigbe, J.E (1999) Helminth parasites of some Tropical Freshwater fish from Osse River in Benin, Southern Nigeria. *Tropical Freshwater Biology* 8: 41 -48.
- Okaka, C.E, and Omoigberale, O.M (2002). Parasites of fishes of Okhuaihe River Edo State. *African Scientist* 3(1) : 1-2.
- Onwuliri, C.O.E. and Mgbemena, M.O. (1987). The Parasitic fauna of some freshwater fish from Jos Plateau, Nigeria. *Nigerian Journal of Applied Fisheries Hydrobiology* 2:33-37.
- Olaosebikan B.D and Raji A. (1998). Field guide to Nigeria freshwater fishes. Federal College of freshwater fisheries Technology, New Bussa. 106pp.
- Paperna, I. (1964). The metazoan parasite fauna of Israel inland water fishes. *Bamidgeh (Bull. Fish Cult Israel)*. 16: 3-66.
- Paperna, I. (1980). Parasites, infections and diseases of fish in Africa. Food and Agricultural Organization,. C.I.F.A. Technical Paper. No. 7, 216pp.
- Ugwuzor, G.A. (1987). A survey of the helminthic parasites offish in Imo River. *Nigerian Journal of Applied Fisheries and Hydrobiology*. 225-30.
- Ukoli, F.M.A (1966). On the life history, growth and development from the metacercarial stage to adulthood of *Clinostomum tilapia* (Ukoli 1966). *J Helminth* 40(1/2) 215- 226.
- Ukoli, F.M.A. (1969). Preliminary report on the helminthic infections in the river at Shagunu (near Kainji). In. *Proc. Accra Symp. Man-made Lakes* (ed. Obeng, E.E.), Accra Ghana, University Press for Ghana Academy of Science. Pp 269-283.
- Umuoeren, N.A., Onwuliri, C.O.E and Anadu, D.I. (1988). Comparative studies in Endohelminth parasites of cultural and in cultured fish from Plateau State. *Nigeria Journal of Applied Fisheries and Hydrobiology*. 3: 45-48.
- Yagamuti, S. (1961). *Systems Helminthum* vol. 3 Part 1 and 2. Nematode Interscience New York. 1261 pp.