

OCCURRENCE OF METACERCARIA OF *Clinostomum tilapae*, (TREMATODE) IN *Oreochromis niloticus*, *Sarotherodon galilaeus* AND *Clarias gariepinus* FROM RIVER BENUE AT YOLA, NIGERIA.

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ABSTRACT

A study of occurrence of metacercaria of *Clinostomum tilapae* was carried out in River Benue at Yola for twelve months. A total of 720 fish samples were collected from River Benue between June 2001 and May, 2002. 240 were *Oreochromis niloticus*, 240, *Sarotherodon galilaeus* and 240 *Clarias gariepinus*. *O. niloticus* showed the highest infection rate 128 (18.33%). The lowest infection 20 (5.83%) were observed in *Clarias gariepinus*. Although there was no significant difference ($P > 0.05$) between infections in the different fish species. *Sarotherodon galilaeus* exhibited infection rate of 58 (15%). All fish species showed high infection rate in the rainy season (June – September) and low in the dry season (October – May).

The males were more infected (42.97%) than females (31.17) in all the three fish species sampled. Weight ranges between 11g and 142g for *O. niloticus* were all infected with metacercaria of *Clinostomum tilapiae*. For *S. galilaeus*, Weight range that was infected was (22-65g), while the weight range of *Clarias gariepinus* that was infected was between 55g and 175g. There was no significant difference ($P > 0.05$) between weight and infection in all the three species sampled.

Key words: *Oreochromis niloticus*, *Sarotherodon galilaeus*, *Clarias gariepinus*, Metacercaria, *Clinostomum tilapae*, prevalence.

INTRODUCTION

Parasite of fish constitute one of the major problems confronting modern fish culturist. Pathological conditions arising from parasite infection cause serious consequences, especially under crowded conditions (concrete ponds) (Meyer and Hoffman, 1976 and Van Dan Brock, 1979). High rate of infection reduces the level of productivity and consequently low income to fish culturist (Onwuleri and Mgbemena, 1987).

Digeneans can infect fish either in the adult form or as metacercariae. The adult digeneans which are harmful to fish are the intestinal species. Metacercariae infection have been found in all inland waters studies in Africa (Khalil 1969; Paerna, 1996). Most of the metacercariae form cysts in the flesh while others occur

in the gall bladder, eye, and branchial region (Paperna, 1996). Awharitoma and Okaka (1999) observed clinostomum, metacercariae on the cichlid fishes in Ikpoma River. Ukoli (1965) reported *Clinostomum complanatum* infecting synodontis in R. Niger. Shorter (1980) reported *Euclinostomum* cat fish from Zaria and *Clinostomum complanatum* was reported in Mormyrid by Oniye, (2002) in Zaria.

This study concentrates on the occurrence of Metacercaria of *Clinostomum tilapae* (trematode) in the branchial region of *Oreochromis niloticus*, *Sarotherodon galilaeus* and *Clarias gariepinus* in River Benue, Yola, Nigeria.

Materials and Methods

Study Area

Adamawa State is located at the North Eastern part of Nigeria. It lies between latitudes 7° and 11°N of the equator and between longitudes 11° and 14°E of the Greenwich Meridian. River Benue which is the major river in this State rises from the highlands of Cameroon and flows southward through Wuro Bokki, Njoboliyo, Rugange, Jimeta-Yola and Numan to join the Niger River at Lokoja. (Figure1). The major tributaries of River Benue include River Gongola, Belwa, Inne, Kilange, Loko and Faro (Adebayo and Tukur 1999).

Sample Collection

A total of 720 fish comprising of 240 each of *Oreochromis niloticus*, *Sarotherodon galilaeus* and *Claria gariepinus* were sampled on a monthly basis from River Benue by the use of set

net, drag net and cast net. The fish were transported fresh in plastic containers as quickly as possible to the laboratory. The total and standard lengths of all the fish species were measured using a meter rule. Fish were weighed using a weighing balance (Sartorius 1219 MP) standard and recorded as described by Lagler (1970).

The gills were removed and placed in a petri dish containing normal saline. At the branchial region where the gills were removed parasite were picked using forceps and preserved in 70% alcohol. The parasites were later washed in distilled water and stained for about 24 hours in a weak solution of Mayer's haemotoxylin before being dehydrated using graded series of alcohol and mounted in Canada Balsam. Parasites were identified according to Paperna (1980). The parasites were then sent to the National Museum London for confirmation.

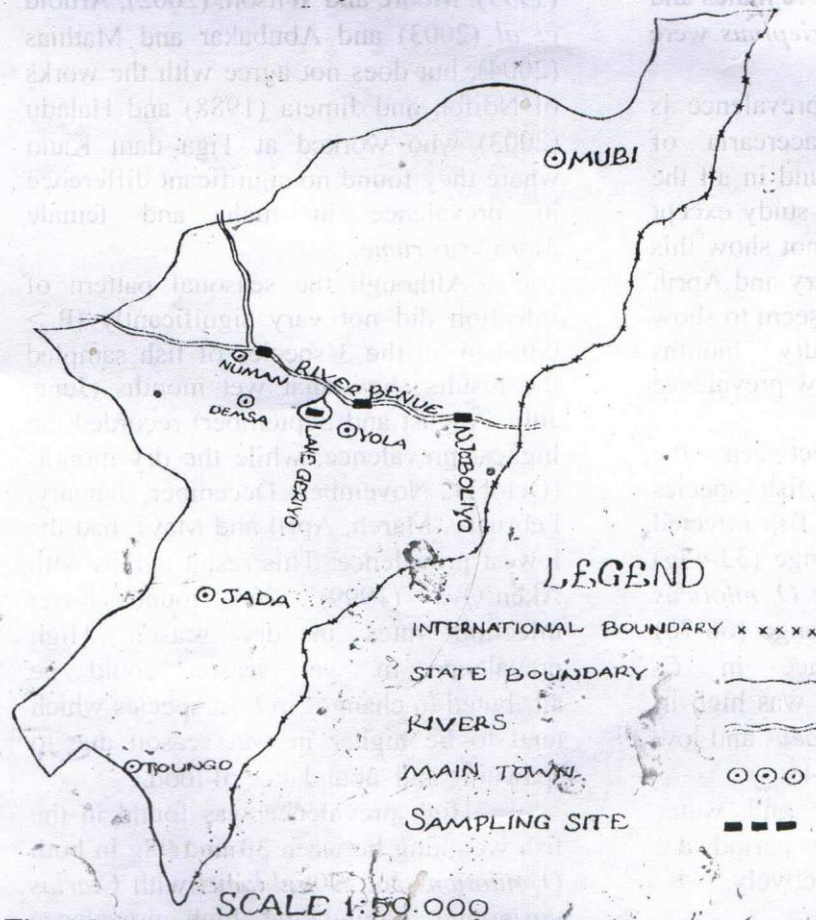


Fig 1 Map of Adamawa State showing sampling sites

RESULTS

Metacercaria of *Clinostomum tilapae* was highly prevalent (18.33%) in *Oreochromis niloticus* and with a worm load of 128 and 3.0 intensity. This was followed by *Sarotherodon galilaeus* which has a prevalence of 15.00% and a parasite load of 58 with intensity of 1.6. *Clarias gariepinus* showed the lowest prevalence of 5.83% with worm load of 20 and intensity of 1.4 in River Benue (Table 1).

The prevalence of metacercaria of *Clinostomum tilapae* by sex in the three fish species is shown in Table 2. Out of 240 *O. niloticus* sampled 132 were males while 108 were females. *O. niloticus* male exhibited a prevalence of 21.21% while their female counterparts have a prevalence of 14.81%. The results also indicated that 17.89% of the *S. galilaeus* males were infected while 11.97% of female *S. galilaeus* were infected with metacercaria of *Clinostomum tilapae*. Table 2 also showed that 6.15% males and 5.46% female of *Clarias gariepinus* were infected by this parasite.

Seasonal pattern of prevalence is shown in Table 3. Metacercaria of *Clinostomum tilapae* was found in all the fish sampled throughout this study except for *C. gariepinus* which did not show this parasite in December, February and April. Wet months, June – October seem to show high prevalence while dry months September to May showed low prevalence in all the three fish species.

The relationship between the weight range of the three fish species examined and the number of fish infected is shown in Table 4. The range (33-43g) showed a high prevalence for *O. niloticus* and *S. galilaeus* while the range (66-76) showed a high prevalence in *C. gariepinus*. The parasite load was high in large *O. niloticus* and *S. galilaeus* and low in large *C. gariepinus* (Table. 4).

The condition factor and water quality during the sampling period are shown in Tables 5 and 6 respectively.

Discussion

The result showed that the prevalence of metacercaria of *Clinostomum tilapae* in *O. niloticus* was higher (18.33%) than that in *Sarotherodon galilaeus* (15%) and *C. gariepinus* (5.83%). This shows that this parasite infects mostly tilapia fish – thus some degree of host specificity (Simkova *et al* 2000). This result is in contrast with that of Awharitoma and Okaka (1999) who found a prevalence of 0.6% in cichlid fish in Kpoba River.

Prevalence of metacercaria of *Clinostomum tilapae* was high in male fish than in female in River Benue. The difference was significant at $P < 0.05$. The parasite load was also high in males than in female. The difference in load may be due to the fact that males, move around to look for females gives a higher probability of contacting the parasites. This result agrees with Paperna, (1980), Aken Ova (1999). Moore and Wilson, (2002), Arnold *et al* (2003) and Abubakar and Mathias (2004), but does not agree with the works of Ndifon and Jimeta (1988) and Haladu (2003) who worked at Tiga dam Kano where they found no significant difference in prevalence in male and female *Mormyrus rume*.

Although the seasonal pattern of infection did not vary significantly ($P > 0.05$) in all the 3 species of fish sampled the results show that wet months (June, July, August and September) recorded the highest prevalence, while the dry months (October, November, December, January, February, March, April and May) had the lowest prevalence. This result agrees with Aken'Ova (1999) who found lower infection rates in dry season. High prevalence in wet season could be attributed to changes in host species which tend to be higher in wet season due to spawning and abundance of food.

High prevalence was found in the fish weighing between 33 and 98g in both *O. niloticus* and *S. galilaeus* with *Clarias gariepinus* having the high prevalence

with weight between 66 and 75g. The observed difference in light and heavy fish in terms of prevalence attributed to feeding habit which affects abundance of parasite (Akogun and Goddard 1991; Ugwuzor, 1987, and Balwin *et al* 1967).

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Table 1 – prevalence of Metacercaria of *Clinostomum tilapae* in three fish species in River Benue

Fish Species	Total No. of fish sampled	No. of fish infected	Parasite load	Prevalence (%)	Intensity
<i>Oreochromis niloticus</i>	240	44	128	18.33	3.0
<i>Sarotherodon galilaeus</i>	240	36	58	15.00	1.6
<i>Clarias gariepinus</i>	240	14	20	5.83	1.4

Table 2 – Prevalence of metacercaria of *Clinostomum tilapae* by sex

Fish Species	Total No. sampled		No. infected		Prevalence (%)	
	Male	Female	Male	Female	Male	Female
<i>Oreochromis niloticus</i>	132	108	28	16	22.21	14.08
<i>Sarotherodon galilaeus</i>	123	117	22	14	17.89	11.97
<i>Clarias gariepinus</i>	130	110	8	6	6.15	5.45

Table 3 Seasonal pattern of infection in *O. niloticus*, *S. galilaeus* and *C. gariepinus* in River Benue, Yola

Fish Spp	<i>O. niloticus</i>			<i>S. galilaeus</i>			<i>C. gariepinus</i>			
	Month of the Year	No. Examined	No. infected	Prevalence %	No. Examined	No. infected	Prevalence %	No. Examined	No. infected	Prevalence %
	Jun	20	8	40.0	20	3	15.0	20	1	5.0
	July	20	10	50.0	20	6	30.0	20	2	5.0
	Aug.	20	10	50.0	20	8	40.0	20	2	5.0
	Sept.	20	6	30.0	20	6	30.0	20	2	5.0
	Oct.	20	2	5.0	20	4	20.0	20	3	15.0
	Nov.	20	2	10.0	20	2	10.0	20	1	5.0
	Dec.	20	1	5.0	20	1	5.0	20	0	0.0
	Jan.	20	1	5.0	20	1	5.0	20	1	5.0
	Feb.	20	1	5.0	20	2	10.0	20	0	0.0
	Mar	20	1	5.0	20	1	5.0	20	1	5.0
	April	20	1	5.0	20	1	5.0	20	0	0.0
	May	20	1	5.0	20	1	5.0	20	1	5.0

Table 4 – Relationship between weight range of different fish species, parasite load and No infected in River Benue, Yola

Species	<i>O. niloticus</i>		<i>S. galilaeus</i>		<i>C. gariepinus</i>		
	Weight range (g)	No. Infected	Parasite load	No. Infected	Parasite load	No. Infected	Parasite load
0-10	-	-	-	-	-	-	-
11-21	3	9	-	-	-	-	-
22-32	2	7	2	3	-	-	-
33-43	20	34	18	23	-	-	-
44-54	4	10	12	19	-	-	-
55-65	1	3	4	13	2	4	-
66-76	5	18	-	-	4	7	-
77-87	3	15	-	-	2	3	-
88-98	2	8	-	-	1	1	-
99-109	1	4	-	-	2	2	-
110-120	1	7	-	-	1	1	-
121-131	1	12	-	-	1	1	-
132-142	1	1	-	-	-	-	-
143-153	-	-	-	-	-	-	-
154-164	-	-	-	-	-	-	-
165-175	-	-	-	-	-	-	-

Table 5 – Mean monthly condition factor for *O. niloticus*, *T. galilaeus* and *C. gariepinus*

Fish spp months of the year	K. factor <i>O. niloticus</i> mean and SD		K. factor <i>T. galilaeus</i> Mean and SD		K. factor <i>C. gariepinus</i> Mean and SD	
	June	2.24-3.65	2.86 ± 0.68	2.17 – 3.27	2.51 ± 0.35	1.92 – 3.65
July	2.16-3.26	2.43 ± 0.26	2.24 – 3.64	2.84 ± 0.77	2.43 – 3.11	2.77 ± 0.34
August	2.83-5.11	2.74 ± 0.67	2.73 – 5.21	2.84 ± 0.42	2.17 – 3.86	3.02 ± 0.71
September	2.94-6.03	3.97 ± 0.35	3.10 – 5.35	4.05 ± 0.47	3.31 – 5.41	4.31 ± 0.52
October	3.16-5.39	4.01 ± 0.38	2.93 – 5.23	3.92 ± 0.42	3.38 – 4.26	3.80 ± 0.33
November	3.50-4.88	4.27 ± 0.32	3.40 – 4.39	3.93 ± 1.87	3.10 – 5.38	4.24 ± 0.27
December	2.94-4.55	3.86 ± 1.86	3.07 – 5.14	3.97 ± 1.91	3.42 – 5.18	4.30 ± 1.76
January	1.20-5.40	3.54 ± 1.85	1.95 – 5.52	3.80 ± 1.92	1.87 – 2.77	2.29 ± 1.09
February	1.46-3.80	3.14 ± 1.74	1.71 – 4.43	3.27 ± 1.28	1.71 – 2.86	2.28 ± 1.09
March	1.96-2.91	2.38 ± 0.22	1.24 – 3.18	3.14 ± 1.36	1.98 – 2.98	2.48 ± 0.26
April	0.02-6.40	2.86 ± 0.93	2.13 – 4.28	3.41 ± 1.92	1.92 – 3.36	2.54 ± 0.43
May	2.29-3.39	2.66 ± 0.25	2.43 – 3.26	2.67 ± 0.36	2.28 – 3.10	2.69 ± 0.25

Table 6 – Mean monthly water quality parameters for River Benue

Parameters Months of the year	DO Mg/l	Temp	PH	CO ₂ Mg/l	Amm Mg/l	Total Phosph Mg/l	Total nitrogen mg/l	Total Alkalinity Mg/l
June	25.70± 0.35	26.4 ± 0.34	8.63 ± 0.10	1.01 ± 0.16	0.66 ± 0.15	0.088±0.02	0.254±0.03	1.18±0.16
July	30.03± 0.74	23.7 ± 0.42	8.93 ± 0.42	0.66 ± 0.14	0.53 ± 0.13	0.075±0.01	0.390±0.16	1.55±0.33
August	27.80± 0.29	22.6 ± 0.32	8.43 ± 0.10	0.61 ± 0.13	0.25± 0.03	0.069±0.01	0.260±0.10	1.45±0.24
September	27.30± 0.34	23.3 ± 0.26	9.20 ± 0.13	0.72 ± 0.17	0.16± 0.01	0.029±0.01	0.241±0.03	1.23±0.10
October	25.60± 0.23	26.8 ± 0.37	8.47 ± 0.10	0.42 ± 0.13	0.08± 0.02	0.022±0.01	0.255±0.01	1.15±0.23
November	23.00± 0.25	26.0 ± 0.38	8.43 ± 0.08	0.51 ± 0.14	0.04± 0.01	0.021±0.01	0.139±0.03	2.08±0.34
December	20.30± 0.21	26.0 ± 0.33	7.63 ± 0.07	0.41 ± 0.16	0.61± 0.12	0.61±0.02	0.128±0.02	1.90±0.32
January	19.63± 0.31	23.6 ± 0.24	7.50 ± 0.04	1.13 ± 0.18	0.06± 0.03	0.022±0.01	0.100±0.06	1.48±0.22
February	22.13± 0.26	19.62 ± 0.22	8.27 ± 0.12	1.00 ± 0.17	0.09± 0.04	0.021±0.02	0.044±0.02	1.34±0.18
March	27.20± 0.31	24.3 ± 0.30	8.77 ± 0.12	1.15 ± 0.20	0.56± 0.15	0.022±0.03	0.040±0.04	1.69±0.32
April	28.40± 0.54	26.7 ± 0.39	8.55 ± 0.13	0.68 ± 0.12	0.47± 0.18	0.043±0.02	0.047±0.01	1.44±0.16
May	26.40± 0.34	23.4 ± 0.26	8.13 ± 0.12	1.07 ± 0.02	0.63± 0.13	0.039±0.01	0.029±0.02	1.64±0.34

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