pp 90 - 96

A Survey of Gastrointestinal Helminth Parasites of Some Fresh Water Fish Species Sold in Makurdi - Benue State, Nigeria.

Okita, F.O[1]., Obadiah, H.I.[1], Umele, U.F[1]. and Orhembega, I.T[1]
[1]Department of Biological Sciences,
Benue State University,
P.M.B. 102119, Makurdi, Nigeria

Abstract

This research was carried out to quantify the burden of gastrointestinal helminthes of fish sold in Makurdi, Nigeria. A total of 800 fish samples consisting of four species (*Alestes nurse*, *Tilapia zilli*, *Oreochromis niloticus* and *Clarias gariepinus*) were purchased from fisher men at Wadata and Wurukum landing sites and taken to the Zoology Laboratory of Benue State University Makurdi for analysis. The length and weight of the fish samples were taken prior to dissection and parasites were recovered and identified following standard procedures. Data generated was analyzed using descriptive statistics and chi square. Results indicated an overall prevalence of 90(11.25%) consisting of four parasite groups: Nematodes 74 (660.7%), Cestodes 10(8.93%), Trematodes 18(16.07%) and Acanthocephalans 10(8.93%) ($P<0.05$). Infection rate was higher (57.78%) in fish length range 21.00 - 25.9cm while those that fell within 6.00 -10.90cm and 11.00 – 15.90cm were not parasitized ($P<0.05$). It was also observed that fish within the standard weight range of 80.00g – 120.9g had the most number of parasites ($p>0.05$). Parasite density was highest (2.33%) in *O. niloticus*. The helminthes recovered were found to inhabit the Intestine 66(58.93%), Stomach 22(19.64%), Liver 20(8.92%), Gills 8(3.57%) and Muscle 6(5.36%) ($P<0.05$). Proper fish handling and preparation as well as screening of wild juveniles and parent stock is recommended to enhance aquaculture and prevent zoonosis.

Introduction

Fish has become an essential and affordable source of protein for both man and livestock, hence attention is being drawn to fish production either in captivity or in the wild. Studies have revealed that some fresh water fish species in Nigeria, harbor rich parasitic fauna (Uruku and Adikwu 2017; Kawe 2016; Goselle *et al.,* 2008; Oniye *et al.,* 2004). Parasites of fish have become a major concern in that their physiology expose the host to secondary infection that result in the nutritive devaluation of fish and subsequently, economic losses (Amos *et al.,* 2018; Adikwu and Uruku 2017). Also, some fish parasites are zoonotic; among which are the Cestodes, Nematodes and Trematodes. According to Onyishi and Aguzie (2018), fish diets contribute to human health and form a staple food for human population in areas where majority of people consume fish, such as Nigeria.

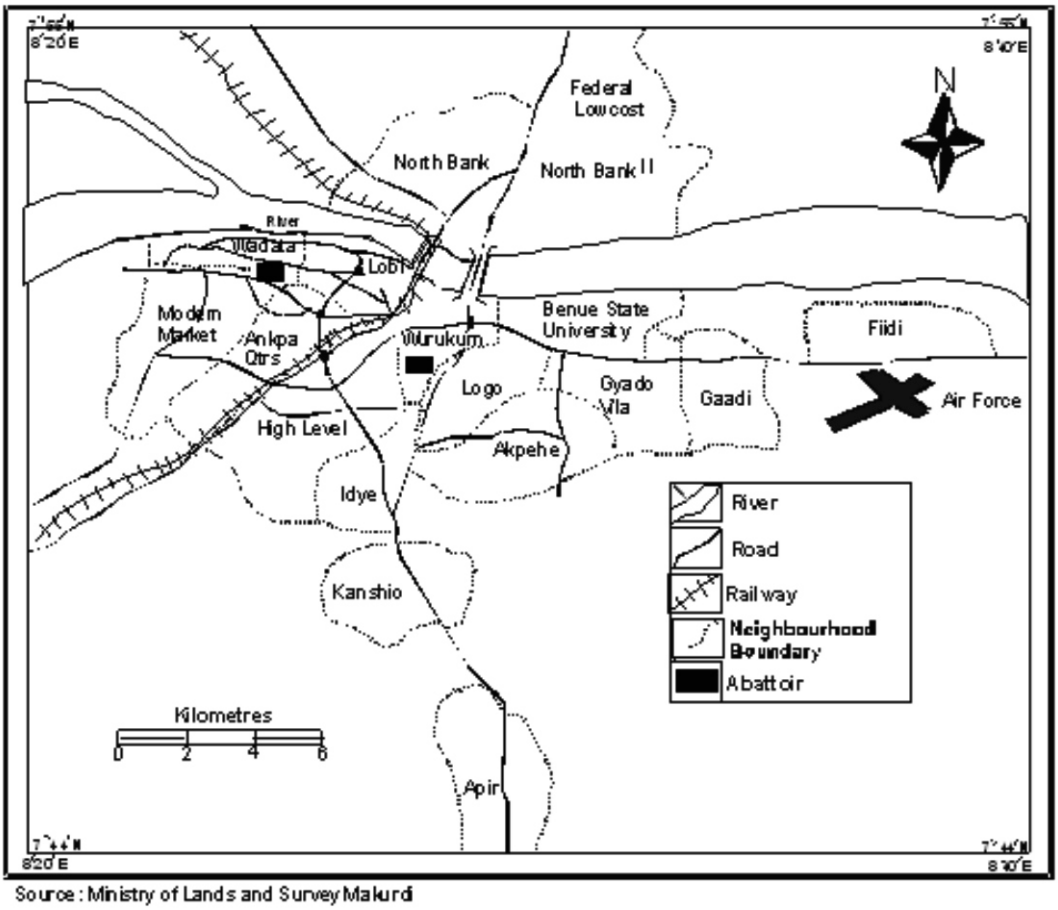
Benue State is incriminated in the patronage of fish and fish diets due to the presence of the River Benue as a major fish source. The role of helminthes in the epidemiology of fish parasitic diseases and possible zoonosis calls for a need to investigate the prevalence and intensity of gastrointestinal helminthes of fish consumed in Makurdi.

Methodology

Study Area and Sample Collection

The study was conducted in Makurdi the capital of Benue State which is located on Longitude $7^0$43'N and Latitude $8^0$32'E. The town is divided into the North and South which is banked by the River Benue. The river Benue exists year-round with water volume fluctuating during the rainy (May-October) and dry (November-March) seasons (Uruku and Adikwu 2017). The river contains various species of fish and plays essential role in the fishing occupation of the Benue people.

A total of 800 samples consisting of four fish species were collected from catch statistics at the Wururkum and Wadata landing sites. Fish species were comprised of: *Alestes nurse, Clarias gariepinus, Oreochromis niloticus* and *Tilapia zilli.* Fish samples were identified using guidelines by Idodo-Umeh (2003). Standard length (cm) and weight (g) were taken as described by Onyishi and Aguzie (2018). Sex of fish were determined via morphological examination and observation for the presence of milt or ovary (Ayanda 2009).



Source : Ministry of Lands and Survey Makurdi

Figure 1: Map of Makurdi indicating sampling sites

Parasites Isolation and Identification

Sampled fish were prepared for parasitological examination for the presence of helminthes using the procedure as described by Goselle *et al.* (2008). Samples from predilection sites that could not be examined on the same day were preserved in 4% formalin contained in appropriately labelled bottles. Parasites were identified using keys described by Pouder *et al.* (2011), Paperna (1966) and Yamaguti (1963).

Statistical Analysis

Parasite load, prevalence and mean intensity were calculated thus:

- Parasite Prevalence (%)=
  Number of infected fish X 100

Total number of fish sampled

- Parasite Mean intensity =
  Total number of parasite X 100

Number of fish infested

- Parasite Load (%) =
  Number of each parasite X 100

Total number of Parasites recovered Chi square was used to compare parasite prevalence and level of significance was set at $P<0.005$

Results

Table 1 shows that of the 800 fish sampled, 90 (11.25%) harboured various parasite fauna, differing in abundance and intensity. A total of 112 parasitic helminthes belonging to 10 species were recovered from the study consisting of: *Camallanus* species 40 (44.44%), *Contracaecum* species 16(17.78), *Bothriocephalus* and *Acanthocephala* species 10(11.11%) each, *Capillaria, Eustrongyloides, Sanguinicola* and *Philometra* species 6(6.67%) each, *Aspidogastrea* species 8 (8.89%) and *Fasciola* species 4(4.44%).

Parasite abundance and intensity in infected fish is as presented in Table 2. *Clarias gariepinus* 64(16.00%) had the highest parasite prevalence , followed by *Alestes nurse* 28(10.96%), *Oreochromis niloticus* 14(5.13%) with the least being *Tilapia zilli* 6(3.41%). In terms of parasite intensity, *O. niloticus* (2.33) had the highest, followed by *A. nurse* (1.75), *T. zilli* (1.50) and *C. gariepinus* (1.00).

The female fish had a slightly higher parasite prevalence 34 (13.28%) than the males 56(10.85%).The most favourable parasite predilection site was the intestine 66(58.93%), followed by the stomach 22 (19.64%), Liver 10(8.92%) Gills 8(3.57%) and Muscle 6(5.36%). This is as shown in figures 2 and 3.

Parasite prevalence in respect to length /weight relation of fish is as presented in figure 4. Fish measuring 21.00cm – 25.90cm had the highest parasite prevalence of 52(57.78%) while those which were within the range of 6.00cm – 15.90cm were not parasitized. Also, infected fish that weighed between 81.00g -120.90g had the highest parasite prevalence 34(37.78%) while those that weighed 281.00g and above were the least 2 (2.22%) infected.

Table 1. Prevalence of gastrointestinal helminthes parasite of fish collected from catch statistics in Makurdi

Fish species	No. examine	No. Infected (%)	Nematodes					Acantho cephala	Cestode	Trematodes		No.of parasites	
			[1]*Pro.* Sp (%)	[2]*Cap* Sp (%)	[3]*Eust* Sp (%)	[4]*Cont.* Sp (%)	[5]*Phil o.* Sp(%)	[6]*Acanth .* Sp (%)	[7]*Both* Sp (%)	[8]*Asp* Sp (%)	[9]*Sang. Sp*	[10]Fas Sp (%)	
Alestes nurse	146	16	8(50.00)	4(25.00	6(37.50)	10(62.50	-	-	-	-		-	**28**
Clarias gariepinus	400	64	28(43.75	-	-	6(9.36)	6(9.36)	10(15.63	10(15.63)	-		4(6.25)	**64**
Tilapiazili	176	4	4(100.00)	-	-	-	-	-	-	2(50.00)		-	**6**
Oreochromis niloticus	78	6	-	2(33.33)	-	-	-	-	-	6(100.00)	6(100.00)	-	**14**
TOTAL	**800**	**90 (11.25)**	**40(44.44)**	**6 (6.67)**	**6 (6.67)**	**16(17.78)**	**6 (6.67)**	**10(11.11)**	**10(11.11)**	**8 (8.89)**	**6(6.67)**	**4 (4.44)**	**11 2**

Df= 3, $x2$ = 12.2858, $P < 0.05$. 1(*Procamallanus* species); 2(*Capillaria* species); 3(*Eustrongyloides* species); 4(*Contracaecum* species); 5(*Philometra* species); 6(*Acanthocephala* species); 7(*Bothriocephalus* species); 8(*Aspidogastrea* species); 9(*Sanguinicola* species); 10(*Fasciola* species)

Table 2: Prevalence and Intensity of Gastrointestinal Parasite based on Fish species sampled

Fish species	No. Examined	No. Infected	Prevalence (%)	Total no. of parasites	Parasite Intensity	Mean Intensity
Alestes nurse	146	16	10.96	28	1.75	
Clarias gariepinus	400	64	16.00	64	1.00	
						1.65
Tilapia zilli	176	4	3.41	6	1.50	
Oreochromis niloticus	78	6	5.13	14	2.33	

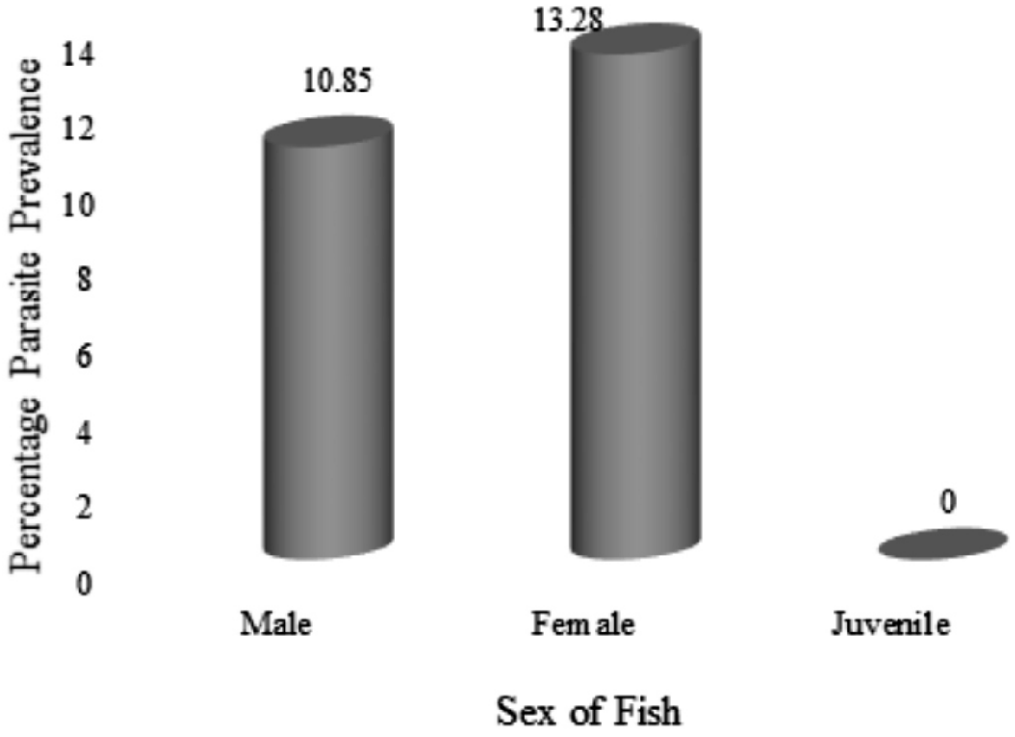


Figure 2: Parasite prevalence of fish based on sex of fish sampled

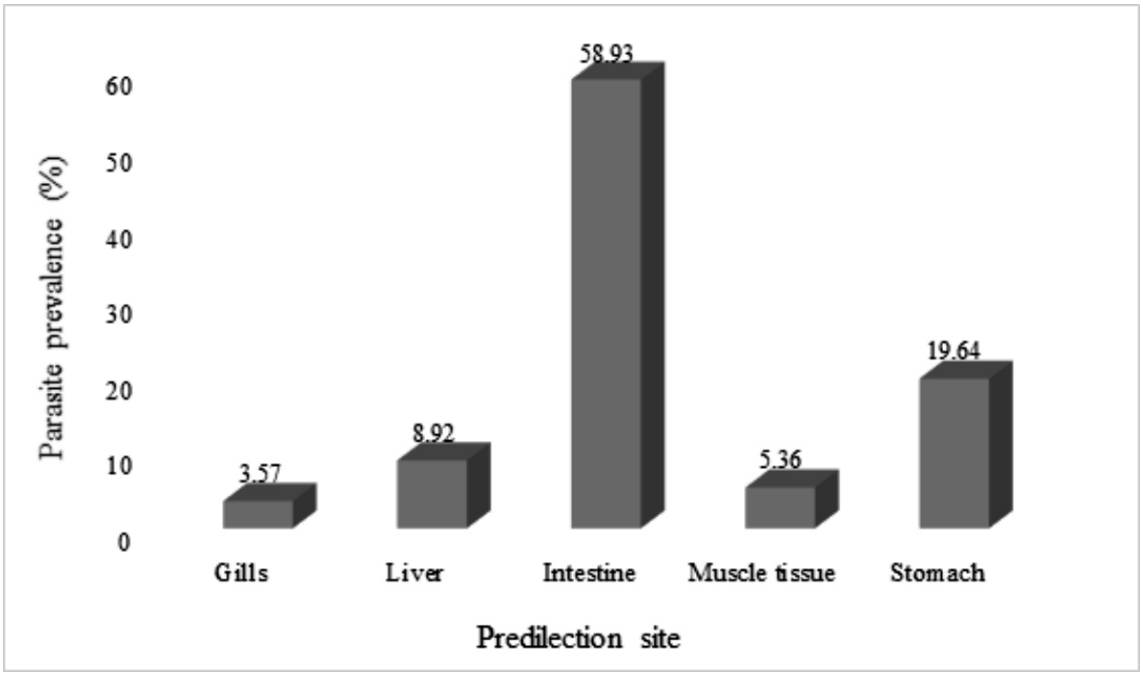


Figure 3: Distribution of helminthes parasites according to predilection site in the host

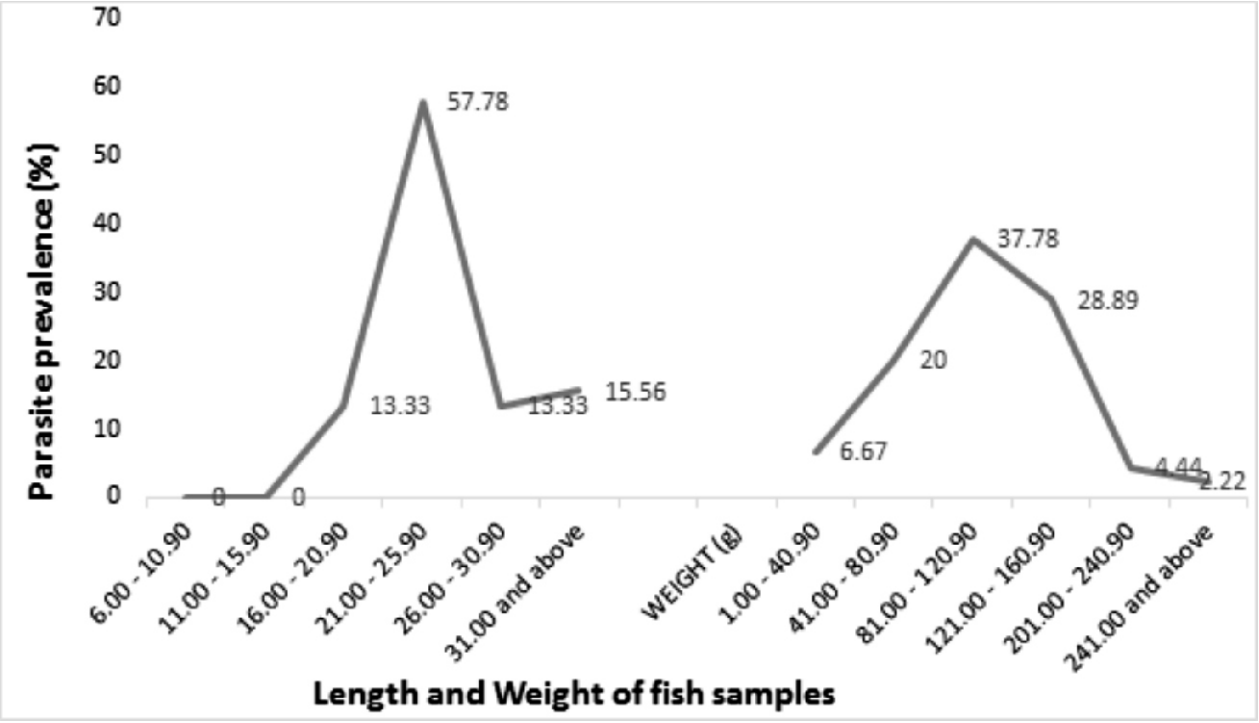


Figure 4: Prevalence of helminthes parasite in respect to fish length/weight relationship

Discussion

Results from the study revealed a total parasite prevalence of 11.25%, consisting of Nematodes, Trematodes, Cestodes and Acanthoceplala in order of abundance. The prevalence recorded in this study is lower than those previously reported from Benue (22.33%), Abuja (67.50%), Ebonyi (65.00%), Jos (51.00%) and Zaria (19.70%) and parasite groups recovered concurs with findings from similar research in other parts of Nigeria (Amos *et al.,* 2018; Onyishi *et al.,* 2018; Goselle *et al.,* 2008 Oniye *et al.,* 2004). Studies conducted in the upper and lower river Benue also showed similar results (Uruku and Adikwu 2017; Omeji *et al.,* 2014). Various factors have been incriminated to contribute to the difference in parasite abundance including: biotic and abiotic conditions of the environment where the study was conducted (Eyo *et al.,* 2013; Thompson and Larsen 2004). Also, the frequency of contact between the fish and infective stages of the parasite due to water run-off in the lower Benue River has been reported to cause seasonal differences in the abundance of parasites on the host (Uruku and Adikwu 2017).

The examined fish population showed a higher parasite prevalence in *Clarias gariepinus* 64 (8.00%) than other species sampled but a higher mean intensity was recorded In *Oreochromis niloticus* (2.33). Oniye *et al.,* (2014) reported that the unequal parsitaemia found in fish could be linked to size, breeding season, age, parasites host preference and diet consumed by fish, most especially, *C. gariepinus*. Studies have shown that the helminthes are generally found in all fresh water fish species but their prevalence and intensity may depend on factors such as parasite species and their biology, hosts physiology and feeding habit, presence of intermediate hosts where necessary, physical factors and hygiene condition of the water body (Kawe *et al.,* 2016; Hussen *et al.,* 2012; Shukerova *et al.,* 2010; Doreen *et al.,* 2009)

The study recorded higher infection rate in females (13.28%) than males (10.85%) with no parasitaemia found in juveniles. This is in consonance with results from Amos *et al.* (2018) who attributed higher infection rate to reduced resistance in gravid females. Also, factors such as differential feeding, competition for mate, spawning, egg production and territorial defense may result in immunological suppressed state of both male and female fish species, with resultant varying degrees of parasite infestation (Amos *et al.,* 2018; Onyishi *et al.,* 2018). The absence of infection in juveniles agrees with Oniye *et al.* (2004) who attributed it to choice of diet (Insects) connoting absence of parasite infective stages in fish diet.

A significantly higher parasite load was recorded in the intestine (58.93%) than other predilection sites. Similar findings have been

reported in Benue state and elsewhere in Nigeria (Uruku and Adikwu 2017; Oniye *et al.,* 2004). This preference may be due to presence of digested food, general surface area of the intestine and feeding habits (Omeji *et al.,* 2011), also, Onwuliri and Mgbemena (1989) reported that helminthes differ in their nutritional and respiratory requirements which may influence their choice of habitat.

Based on length, fish that fell within the range of 21.00 – 25.90 cm had the highest prevalence (57.78%). This depicts that adult fish have less immunity against parasites than juveniles as similarly reported (Amos *et al.,* 2018; Uruku and Adikwu 2017). This also agrees with the researches which attributed higherv parasite prevalence in bigger fish to time of exposure to environment by body size, random selection of specimen and probable high level of immunity built up in fish specimen (Omeji *et al.,* 2014; Ekanem *et al.,* 2011; Akinsanya *et al.,* 2008)

A higher parasite percentage was seen in samples weighing between 81.00 – 120.90g (small fish) than those which weighed 281.00g and above (big fish). Similar findings have also been documented (Uruku and Adikwu 2017; Nyaku *et al.,* 2007; Tasawa *et al.,* 2007). Also, contrasting results have been reported by Ugbor *et al.* (2014). Fish parasitaemia condition factors can be influenced by age, sex, season, stage of maturation, fullness of girth, diet, amount of fat reserve and musculature (Amos *et al.,* 2018)

Conclusion

Parasite abundance of fish sold in Makurdi as shown in this study, depicts a fauna that has been proven to cause zoonosis. Hence education on proper fish handling and preparation of fish prior to consumption is recommended.

References

Akinsanya, B., Hassan, A.A. and Adeogun, A.O. (2008). Gastrointestinal helminth parasites of the fish *Synodontis clarias* (Siluriformes: mochokidae) from Lekki Lagoon, Lagos, Nigeria. Revised Biology Tropic. *International Journal of Tropical Biology*, 56(4): 2021-2026.

Amos, S.O., Eyiseh, T.E. and Michael, P.T. (2018). Parasitic infection and Prevalence in *Clarias gariepinus* in Lake Gerio in Adamawa state. *MOJ Anatomy and Physiology*, 5(6):376-381

Ayanda, O.I. (2009). Comparison of parasitic health infection between the sexes of Clarias gariepinus from Asa Dam Ilorin, North-Central Nigeria. *Scientific Reasearch and Essay*, 4(4): 357-360

Doreen, Z.M., Chakanesta, C. and Phumuzile, Y. (2009). Observation on the helminth parasite of fish in Insukamini Dam, Zimbabwe. *Research Journal of Agriculture and Biological Science,* 5(5): 782-785.

Ekanem, A.P., Eyo, V.O. and Sampson, A.F. (2011). Parasites of landed fish from Create Kwa River, Calabar, Cross River State, Nigeria. *International Journal of Fisheries and Aquaculture,* 3(12): 225-230

Eyo, J.E., Iyaji, F.O. and Obiekezia, A,I, (2013). Parasitic infestation of *Synodontis batensoda* (Ruppell 1832, Siluriformes, Mockokidae) at Rivers Niger-Benue Confluence, Nigeria. *African Journal of Biotechnology,* 12: 3029-3039.

Goselle, N., Shir, G.I., Udeh, E.O., Abelau, M. and Imandeh, G.N. (2008). Helminthe parasites of *Clarias gariepinus* and *Tilapia zilli* at Lamingo dam, Jos, Nigeria. *Science World Journal*, 3(4): 23-27.

Hussen, A., Tefera, M. and Asrate, S. (2012). Gastrointestinal helminth parasite of *Clarias gariepinus* (Catfish) in Lake Hawassa, Ethiopia. *Scientific Journal of Animal Science*, 1(4): 131-136

Idodo-Umeh, G. (2003). Fresh water fishes of Nigeria (taxonomy, ecological note, die and utilization). Idodo-Umeh publishers, Edo state Nigeria.

Kawe, S.M., God's power, R.O., Balarabe, M.R. and Akaniru, R.I. (2016). Prevalence of gastrointestinal helminth parasites of *Clarias gariepinus* in Abuja, Nigeria. *Sokoto Journal of Verterinary Sciences,* 14 (2):26-33.

Nyaku, R.E., Okayi, R.G., Kolndadacha, O.D. and Abdulrahman, M. (2007). A survey of ectoparasites associated with 3 species of fish Auchenoglanis occidentalis, Oreochromis niloticus and Bagrus bayad, in River Benue, Makurdi, Benue State, Nigeria. Proceedings of the 22nd Annual Conference of FISON, Kebbi, Nigeria,

10-14

Omeji, S., Solomon, S.G. and Idoga, E.S. (2011) A comparative study of the common protozoan parasites of *Clarias gariepinus* from the wild and cultured environments in Benue State, Nigeria. *Nigerian Journal of Parasitology Research,* 8.

Omeji, S., Tiamiyu, I.O., Annune, P.A. and Solomon, S.G. (2014). Ecto and intestinal parasites of *Malapterurus electricus* from the upper River Benue. *Journal of Global Bioscience*, 3(6):895-903

Oniye, S.J., Adebote, D.A. and Ayanda, O.I. (2004). Helminth parasites of *Clarias gariepinus* (Teguels) in Zaria, *Nigerian Journal of Aquatic Science*, 19(2):71-75.

Onwuliri, C.O.E. and Mgbemena, M.O. (1989). The parasite fauna of some fresh water fish from Jos, Plateau State, Nigeria. *Journal of Applied fisheries and Hydrobiology*, 2:33-337.

Onyishi, G.C. and Aguzie, I.O.N. (2018). Survey of helminthe parasites of fish in Ebonyi River at Eha-amufu, Enugu state, Nigeria. *Animal Research International,* 15(3): 3112-3119

Paperna, I. (1996). Parasites infection and diseases of fish in Africa. An update. CIFA Technical Paper FAQ, Rome, 31:200

Pouder, D.B., Curtis, E.W. and Yanong, R.P.E. (2011). Common freshwater fish parasites pictorial guide: Sessile ciliates. http:edis.ifas.ufl.edu/FA-107. Accessed on 10th March 2018.

Shukerova, S., Kirin, D. and Hanzelova, V. (2010). Endohelminth communities of the perch, *Perca fluviatilis* (Perciformes, Percidae) from Srebama Biosphere Reserve, Bulgaria. *Helminthologia*, 42(2): 99-104

Tasawar, Z., Umer, K. and Hayat, C.S. (2007). Observations on lernaeid parasites of *Catla catla* from a fish hatchery in muzaffargarh, Pakistan. *Pakistan Verterinary Journal,* 27(1): 17-19.

Thompson, L.C. and Larsen, R. (2004). Fish habitat in freshwater stream. Farm water quality planning (FWQP) reference sheet,10.3, Publication 8112. University of Carlifornia, Carlifornia.

Ugbor, O.N., Odo, G.E., Nwani, C.D., Ochang, S.N., Somdare, P.O. and Agbakwuo, C.A. (2014). Parasitic fauna of two dominant Clariid (Siluriformes) catfishes in a tropical freshwater ecosystem, Nigeria. *Nigerian Journal of Fisheries*, 11 (1&2): 744-752.

Uruku, M.N. and Adikwu, I.A. (2017). Seasonal Prevalence of parasites of Clariids Fishes from the Lower Benue River, Nigeria. *Nigerian journal of Fisheries and Aquaculture*, 5(2): 11-19.

Yamaguti, S. (1963). Syestema Helminthum: the Acanthocephala. Inter-science Publisher, New York. 142Pp.