Bima Journal of Science and Technology Vol. 2 No. 2 June, 2018 ISSN 25366041

SURVEY OF PARASITES OF *Synodontis schall* IN DADIN KOWA DAM, GOMBE STATE, NIGERIA

*Nuru A. Garkuwa, Bilikisu Rueben, Zainab Isah, Sani Ibrahim Aliyu, Bara'atu Abubakar, Zaliha Adamu Umar

Department of Biological Sciences, Gombe State University, Gombe, Nigeria
*Correspondence Address: ngarkuwa@gsu.edu.ng, +2348065585642

Abstract

Parasitic disease of fish seems to be one of the major problems confronting fish culturists. A parasitic infestation leads to serious consequences especially to the nutritive devaluation of the fish. Therefore the Endoparasites and Ectoparasites of *Synodontis schall* (up-side down catfish) from Dadin Kowa dam were investigated. In this research, there was no ectoparasite found in this research. Out of the 50 specimen examined, there was no ectoparasite. However, 27 were found to be infected by three species of endoparasites viz: *Eustrongylides* sp, *Procallamus* sp and *Diphyllobothrium latum* were recovered from the stomach and intestine of the sampled fish species. A total of 90 helminthes were identified from *Synodontis schall*; Nematodes accounted for (83.34%) and Cestode (16.67%). There was no significant difference ($p>0.05$) in the parasite load between the male and female species when examined statistically. The females of the fish species had higher parasitic prevalence (34.0%) than the males (20.0%) suggests that females may be more prone to infection during breeding periods. It was also observed that the intestine of the sampled fish had higher percentage parasite load suggesting that fish diet in the fishing ground were responsible for high rate of infestation of *Synodontis schall.* Therefore, it is recommended that there is need for proper cooking of fish before consumption.

Keywords: Parasites, *Synodontis schall*, Helminths, Nematodes, Dadin Kowa dam

Introduction

Synodontis schall is a species of upside down catfish and belongs to the family Mochokidae (Ofori-danson *et al*., 2002). *Synodontis* species are currently restricted to freshwaters of Africa, occurring mostly in central and West Africa (Koblmuller *et al.*, 2006). They are the most widely distributed *Mochokid* genus occurring throughout most of the rivers in the sub-Saharan Africa and Nile systems (Friel and Viglotta, 2009), with over 23 species in Nigerian rivers (Idodo-Umeh, 2003).

Catfishes of the genus *Synodontis* are small to medium-sized fish; they are highly valued food fish and contribute an unquantified but significant proportion to the fishery resources of rivers (Baras and Laleye, 2003). It contributes significantly to the economy of the fishers since it is affordable and acceptable to the general populace (Iyaji *et*

al., 2009). *Synodontis* grows to a length of at least 400mm and a weight of more than 1kg in the natural environment (Reed, *et al*., 1967). Mochokids are beautiful fish species with a strong powerful spine on the dorsal and pectoral fins with bony head structures extending towards the posterior of the dorsum. They are short stumpy and stout-like fish (Laleye *et al*., 2006).The species contribute significantly to the economy and health benefits of the fishers in the riverine areas where other sources of protein are beyond the reach of the poor populace (Mollsten *et al*., 2002).

Fish parasites are numerous and many phyla in the animal kingdom have representatives that are parasitic to the fish. There are by far more parasitic species that infect fish than any other group of infectious disease (Blazer, 2006). Most fish in the wild are likely to be infected with parasites , but in majority of cases, no significant harm to the host may be identified, thus, they are only few reports of parasites causing mortality or serious damage to the fish population, but this may be largely because such effects go unnoticed (Roberts, 2001). The effects of parasites on fish include nutrient devaluation, alteration of biology and behaviour (Lafferty, 2008), lowering of the immune capability, induction of blindness (Echi *et al*., 2009), morbidity, mortality, growth (Nmor *et al.*, 2004) and mechanical injuries depending on the parasite species and load (Echi *et al*., 2009). Fishermen or consumers observe parasites in wild fish only when they are so obvious as to lead to rejection of fish (Roberts, 1995).

Parasites especially protozoan and helminthes are among the most devastating agents in aquaculture affecting the health of many species of fish and making them susceptible to secondary infections by viruses, fungi and bacteria (Akinsanya and Otubanjo, 2006). More than 70 species of protozoan and helminthic parasites can reach humans by food and water through the consumption of sea and or freshwater foods. Differential symptoms of parasites by the consumption of raw or slightly preserved fish all have gastrointestinal symptoms such as vomiting, diarrhoea, abdominal pain and nausea in humans (Raysahelian, 2012).

Parasitic disease of fish seems to be one of the major problem confronting fish culturists. A parasitic infestation leads to serious consequences especially to the nutritive devaluation of the fish (Olofintoye, 2006). Affected fish is unmarketable, causing severe economic loss to fish farmers and fishers. In addition, it also leads to allergic responses to toxic waste of parasites which may be evident in consumers of infected fish (Olofintoye, 2006).

Although researches have been carried out on parasites of fish, however, knowledge of the parasites of *Synodontis schall* of Dadin Kowa dam in Gombe State is not known, hence the need for scholarly research. Therefore, this study seeks to provide information on the parasites associated with *Synodontis schall* in terms of parasite infection. This is expected to be achieved through: examination of the parasite present in the external and internal surface of *Synodontis schall*; determination of the

prevalence of parasites between male and female fish *Synodontis schall* of the dam.

Methodology

Description of the study area

Dadin Kowa dam is located in Yamaltu Local Government Area of Gombe State in Northeastern Nigeria. The dam is about 35km to the east of Gombe town along Gombe-Biu road with longitude 11°30ˆE and 11°32ˆE and latitude 10°17ˆN and 10°18ˆN of the equator (UBRDA, 1980). The dam was built by the federal government of Nigeria in 1984 on the Gongola River, with the goal of providing irrigation and electricity for the planned Gongola sugar plantation project.

The reservoir has a capacity of 800 million cubic meters of water and a surface area of 300 square kilometres and has a potential as a source of fish. The dam presently supplies the entire Gombe metropolis and other settlement along the road with potable drinking water for both human and livestock use, which supply about 30,000 cubic metres daily (Mu'azu, 2011). The dam also irrigates about 6,600 hectares of farmland yearly and also acts as a popular tourist area (Mark, 2001; Nwezeh, 2010).

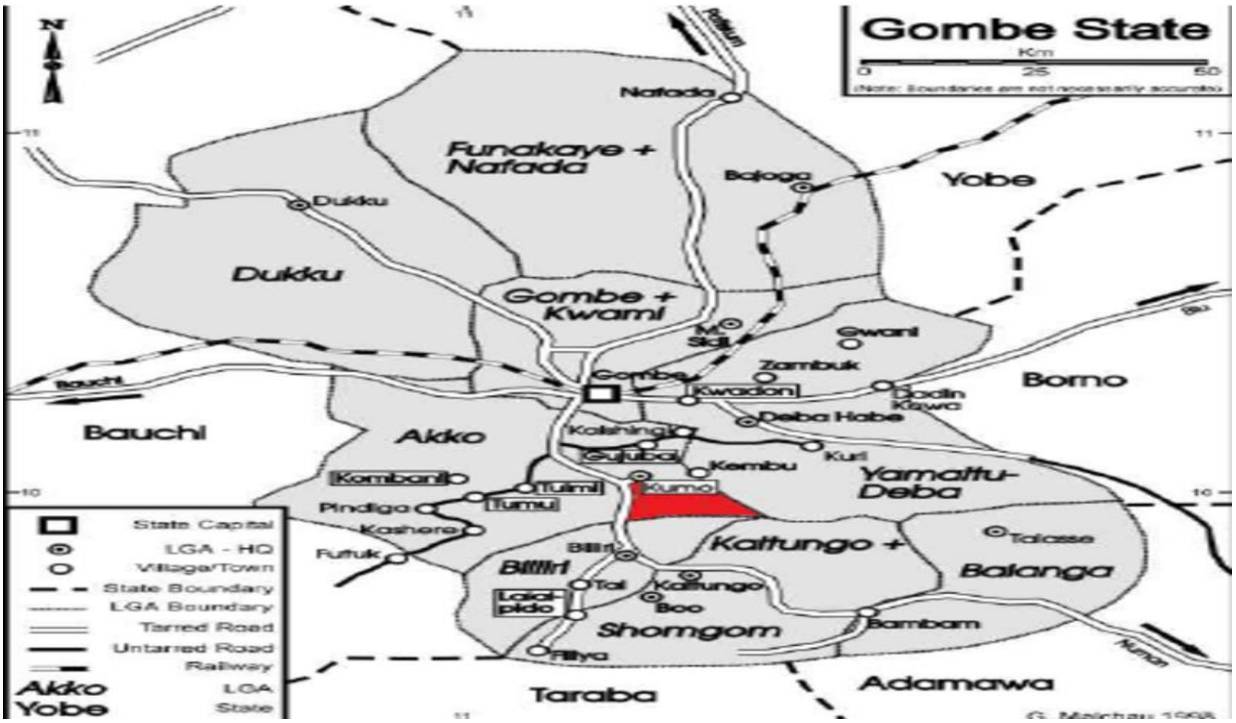

Figure 1: Map of Gombe indicating the study area (Source: Adang *et al.,* 2015)

Collection of fish specimen

A total of 50 samples of *Synodontis schall* of different sizes were collected and transferred into a plastic container with ice packs and transported to a laboratory in Gombe State University.

Samples were collected between 7:00am-10:00am weekly as recommended by Adebisi (1981). Transportation was done in the morning to avoid undue stress to temperature rise. The fishes were sorted by size and sexes, and were identified using the identification manual (Olaosebikan and Raji, 2004; Reeds *et al*., 1967).

Sample analysis

The external and internal reproductive structures were observed to determine the sex of the fish. In catfish, males were characterized by the presence of genital papillae located on the ventral side, just before the anal fin through which both milt and urine pass. This structure is absent in females, the female possess an oviduct and a urinary pore. This was confirmed by the presence and absence of testes and ovaries which were observed during dissection (Bichi and Yelwa, 2010).

Measurement of length and weight

The total length was taken from the tip of the snout to the extreme end of the caudal fin using a meter rule to the nearest centimeter and the standard length from the tip to the snout to the caudal peduncle. Fishes were weighed to the nearest gram using a manual weighing balance and recorded in accordar Garkuwa *et al*., 2018 employed by Ibo *et al*. (2016).

Parasitological analysis

The body of the fish were examined and placed on the dissecting board. A cut was made on the ventral side of the fish from the anal opening to the lower jaw using a surgical blade to expose the body cavity and most of the internal organs. The oesophagus, stomach, intestine and rectum were separated and kept in different Petri-dishes containing saline solution. The contents of the stomach and intestine were washed in different Petri-dishes for sedimentation and floatation and then examined for parasites under the microscope x40 objective (Sikoki *et al*., 2013; Al Mofarreh *et al*., 2000). Parasites found were transferred into another Petri-dishes containing normal saline and examined. The parasite species and location in the host species were recorded. Identification of parasites was done using standard reference identification manual by Pouder *et al*. (2005) and Paperna (1996).

Statistical Analysis

Statistical Package for Social Sciences (SSPS) version 20 was used to explore our data and descriptive Statistics was performed.

Results

The result of the survey of endoparasite in *Synodontis schall* of Dadin kowa dam, Gombe State has shown that out of a total sum of 50 fish specimen (*Synodontis schall*) examined, no ectoparasite was found. Of the 50 *Synodontis schall* that were examined, 27(54.0%) were infected with endoparasite while 23(46%) were not infected (Table 1).

Table 1: Frequency of occurrence of endoparasite of *Synodontis schall*

	Fish number	**% frequency**
Number of fish infected	27	54
No. of fish non-infected	23	46
Total	**50**	

Infections of *Synodontis schall* by sex showed that females had higher infection than the male (Table 3). Although females were infected more with parasite species, there was no significant difference in the infection of male and female *Synodontisschall*, P>0.05 (chi-square = 0.441).

Table 1: Parasite found in *Synodontis schall*

Parasite	**Taxonomic group**	**Number recovered**	**% Infection**
***Eustrongylides* species**	Nematode	25	27.78
***Procallamus* species**	Nematode	50	55.56
Diphyllobotrium latum	Cestode	15	16.67
Total		**90**	**100**

A study of the result revealed that only two classes of parasitic helminthes were found; cestodes and nematodes. A total of 90 helminthes were identified during the research. The nematode parasite infected more fish hosts than any other parasitic group out of the 90 parasite recovered. *Procallamus species* recorded the highest infection with a prevalence of 55.56%, *Eustrongylides species* accounted for 27.78% and the cestode, *Diphyllobotriumlatum* 16.67% (Table 3).

Table 3: Prevalence of parasites in relation to sex of *Synodontis schall*

Sex	Number of fish examined	Number of fish infected	% Prevalence
Male	21	10	20
Female	29	17	34
Total	**50**	**27**	**54**

Discussion

From the results obtained in Table 1, the overall prevalence of 54.0% was observed in this study which is similar to the high prevalence reported by Ekanem *et al*. (2011) but lower than the prevalence of 60.23% observed by Olofintoye (2006) in some freshwater fish in Ekiti State. This indicates that the distribution of parasites varies from one habitat to the other which could be attributed to host-parasite relationship and some abiotic factors like dissolved oxygen, temperature and pH.

In Table 2, the number of nematodes recovered was higher than Cestodes which is similar to the findings of Ekanem *et al*. (2011) and Onyideneke *et al*. (2010) who reported higher number of nematodes than any other parasites in fish which might be due to the consumption of bottom dwelling invertebrates that are present in the water body and have been infected by these parasites.

It is common to find a fish harbouring several parasites rather than only a single parasitic species. In this study, *Synodontis schall* were infected with *Eustrongylides* spp, *Procallamus* spp and *Diphyllobotrium latum*. *Eustrongylides spp* and *Procallamus* spp were recovered in the stomach and intestine of the sampled species. According to Ekanem *et al*. (2011), nematodes are known to occur in body cavities or found penetrating the subcutaneous tissues. Host specificity of nematodes agrees with the findings of Akinsanya *et al*. (2007) who reported a number of nematodes from the intestine of tilapia fish from River Osun.

Eustrongylides spp and *Procallamus spp* were more in the stomach than intestine while *Diphyllobotrium latum* were more in the intestine than stomach of the sampled species. However, it was observed that the intestine had more parasites than the stomach and this might be due to the presence of digested food present in the intestine or due to greater surface area present in the intestine. Marcogliese (2002) reported that, most parasite inhabit the intestine because of their general feeding habits.

Difference in the prevalence of endoparasites in male and female could be as a result of physiological states. Aloo *et al*. (2004) revealed that, difference between

parasitic loads based on sex might be physiological. Emere and Egbe (2006) also stated that females were more susceptible to parasite infection during spawning or breeding periods and that the resistivity of most gravid females may reduce due to infection by the parasites. In addition, their increased food intake to meet requirement for the development of eggs might have exposed them to more contact with parasite which subsequently increased their chances of being infected.

Conclusion

Endoparasites were recovered in *Synodontis schall* and they include *Eustrongylides* spp, *Procallamus spp* and *Diphyllobotrium latum* belonging to the taxonomic group of nematodes and cestodes respectively. Based on this research *Synodontis schall* of Dadin Kowa dam, were infected with stomach and intestinal parasite that could pose public health concern to fish consumers who consume raw, improperly cooked or smoked fish. It is hoped that this research elicit the interest of fish parasitologists in the area for more information on the parasite infecting *Synodontis schall* and other fish species in Dadin Kowa dam, Gombe State. Fishes from Dadin Kowa dam should be properly cooked or smoked before consumption to avoid health risk due to some parasites.

References

Adang, K.L., Ayuba, J., and Yoriyo, K.P. (2015). Ectoparasite of sheep (*Ovisaries* L.) and Goats (*Capra linus* L.) in Gombe State, Nigeria. *Pakistan Journal of Biological sciences*, 18:224-231.

Adebisi, A.A. (1981). The physico-chemical hydrobiology of a tropical seasonal River-Ogun. *Hydrobiology*, 7:157-167.

Akinsanya, B., and Otubanjo, O.A. (2006). Helminthes parasites of *Clarias gariepinus* in Lekki Lagoon, Lagos, Nigeria. *Revised International Journal Tropics*, *54*(1): 93-99.

Akinsanya, B., Otubanjo, O. A. and Hassan, A.A. (2007). Helminth parasites of *Malapterurus electricus* Malapteruridae from Lekki Lagoon, Lagos, *Nigerian Journal of Animal Science*, *3*(3): 1-5.

Al Mofarreh, M. A. Al Akwau¸ A. M. Hasan, S. W. Al Mofle, I. A. (2000). Method in the diagnosis of Active *Schistosoma mansoni* in patients with detectable IH. *Saudi Journal of Gastroenterol*. *6*: 157-160.

Aloo, P.A., Anam, R.O. and Mwangi, J.N. (2004). Metazoan parasites of commercially important fish along the Kenyan coast. *Western Indian Journal of Marine Science*, *3*(1): 71-78.

Baras, E. and Laleye, P. (2003). Ecology and Behaviour of catfishes. Science Publishers. Inc. U.S.A.pp 525-579.

Bichi, A.H. and Yelwa, S.I. (2010). Incidence of Piscine parasite on the gills and gastrointestinal tract of *Clarias gariepinus* at Baguada fish farm, Kano. *Bayero Journal of Pure and Applied Sciences*, *3*(1):104-107.

Blazer, V.S. (2006). Major infections, diseases of fish (online). http://wsww.afip.org/vetpath/POLA/fish diseases.

Echi, P.C., Eyo, J.E., and Okafor, F.C. (2009). Co-Parasitism and Morphometric of three Digenea: Clinostomatidae from Tropical freshwater lake. *Animal Research International*, *6*(2):982-986.

Ekanem, A. P., Eyo, V.O. and Sampson, A.F. (2011). Parasite of landed fish from great Kwa River, Calabar, Cross River State, Nigeria. *International Journal of Fisheries and Aquaculture*, *3*(12): 225-230. [online] www.academicjournals.org.

Emere, M.C. and Egbe, N.E.L. (2006). Parasites of *Synodontis clarias* (A Fresh Water Fish). *Best Journal*, *3*(3):58-64.

Friel, J.P., and Viglotta, T.R. (2006). *Synodontis acanthopsia* a new species from Ogue River system, Gabon, with comments on spiny ornamentation and sexual dimorphism in Mochokid catfishes. *Zootaxonomy*, *11*(26):45 – 46.

Ibor, CI., Ajang, RO and Arong, G.A. (2016). Comparative Study and Zoonotic Implications of Endoparasitic fauna in *Chrysichthys nigrodigitatus* from Great Kwa River and Calabar River, Cross River State, Nigeria. *Journal of Biology, Agriculture and Healthcare*, *6*(19):27. (Online) www.iiste.org. ISSN 2224-3208 (Paper) ISSN 2225-093X.

Idodo – Umeh, G. (2003). Freshwater fishes of Nigeria. (Taxonomy, ecological notes, diet and utilization). Idodo-Umeh Publishers Ltd. Benin city. 133 – 134.

Iyaji, F.O., Etim, L., and Eyo, J.E. (2009). Parasites Assemblage in fish host. *Bio-Research*, *7* (2):561-570.

Kobmuller, S., Sturmbauer, C., Verheyen, E., Meyer, A. and Salzburger, W. (2006). Mitochondrial phylogeny and phylogeography of East Africa Squeaker Catfishes (Siluriformes: *Synodentis*). *BMD Evolutinary Biology*, *6*:49.

Lafferty, K.D. (2008). Ecosystem consequence of fish parasite. *Journal of fish Biology*.73:2083-2093.

Lalèyè, P., Chikou, A., Gnohossou, P., Vandewalle, P., Claude, J.P. and Teugels, G. (2006). Studies on the biology of two species of catfish *Synodontis schall* and *Synodontis nigrita* (Ostariophysi: Mochokidae) from the Ouémé River, Bénin. *Belgian Journal Zoology*, *136* (2): 193-201.

Marcogliese, D.J. (2002). Food webs and the transmission of Parasites to marine fish. *Parasitology*, *124*(7):83-99.

Mark, W. A. (2001). Green development: environment and sustainability in the Third World. Routledge. p. 238. ISBN 0-415-14766-2.

Mollsten, A.V., Dahlquist, G.G., Stattin,E.L. and Rudberg, S.R. (2002). Higher intake of fish protein related to lower risk of microalbumia in young Swedish type 1 diabetic patient.

Mu'azu, A.H.(2011). Modibbo Adama University of Technology Yola and National Office for Technology Acquisition (NOTAP) Research Opportunities in River Basins Development Authorities. (A case study of Upper Benue Basin). 8p. (Online). http://notap.gov.ng/sites/default/files/mod_ad_univ_of_tech_yola_and_national_abba_muazu.pdf.

Nmor, J.C., Egwunyega, A.O., and Ake, J.E. (2004). Observation of the intestinal helminth parasites of Cichlid in the upper reaches of River Orogodo, a Freshwater body in Delta State, Nigeria. *Tropical Freshwater Biology*, *13*:131-136.

Nwezeh, K. (2001). "FG to Spend $32m On Gombe Dam Project". This Day. Retrieved 2010-05-23.

Ofori – Danson, De Graaf, G.F., and Vanderpuye, C. (2002). Population parameters estimate for *Chrysichthys auratus* in Lake Volta, Ghana. *Fish .Res*. *54*:267 – 277.

Olaosebikan, B.D., and Raji, A. (2004). Field guide to Nigerian freshwater fishes. Federal College of Freshwater Fisheries Technology Publication, New Bussa, Nigeria. 160pp.

Olatunde, A.A (1977). The distribution, abundance and trends in the establishment of the family in lake Kainji, Nigeria. *Hydrobiologia*, *50*:69-80.

Olofintoye, L.K. (2006). Parasitofauna in some frehwater fish species in Ekiti State, Nigeria. *Asian Network for Scientific Information*, *5*(4):359-362.

Onyedineke, N.E., Obi, U., Ofoegbu, P.U. and Ukogo, I. (2010). Helminth Parasite of some Freshwater fish from River Attlushin, Edo State, Nigeria, *Journal American Science*, *6*(3):16-21.

Paperna, I. (1996). Parasite infections and disease of fish of Africa an update of CIFA Technical paper *31*:157-170.

Paul, J.B.H and John, D.R. (2002). Hand book of fish biology and fisheries, black web publishers, 359-384pp.

Pouder, D. B. Curtis, E. W. and Yanong, R. P. E. (2005). Common freshwater fish parasites pictorial guide, Extension edis.

Raysahelian, M.D. (2012). Protozoan infection, medical illness and natural treatment. (Online) http://www.raysahelian.com/protozoan.html. Retrieved 2017-06-01.

Reed, W., Burchard, J. and Hopson, A.J. (1967). Fish and Fisheries of Northern Nigeria. Kaduna, Nigeria, Ministry of Agriculture, Kaduna Government Printer. Northern Nigeria.226.

Roberts, R.J. (1995). Parasitology of Teleosts In: Fish Pathology, Roberts,

R.J. (Ed.). 2nd ed., Bailliere Tindall, London, pp: 242-288.

Roberts, R.J. (2001). Fish pathology. Parsitology of Teleosts (Roberts R.L.) [online] http://www.afip.org/vetpath/POLA/99/Diseases_of_ Fish.htm.\

Sikoki, F. D. Nzeako S. O. Nchege, B. (2013). Evaluation of Nematode parasitemia *Oreachromis niloticus* from lower New Calabar River, Port Harcourt, Niger Delta, Nigeria. *International Journal of Science Research in Evironmental Sciences*, (IJSRES). *1*(10): 263-267.

Upper Benue River Basin Development Authority (UBRDA) 1980). Dadin-Kowa Resettlement Project, Draft final report. Vol. 2.