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Prevalence of Gastrointestinal Helminthes Associated with *Synodontis schall* from Otuogori River, Ogbia Local Government, Bayelsa State.

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Abstract
Fish and fisheries are excellent sources of nutrients to humans and animals and also serve as routes of zoonoses of great public concern. As a result of the role of fish in meeting the protein demand of consumers especially in rural areas, information on the parasites of fish becomes particularly important. This study aimed at determining the prevalence of gastrointestinal helminthes in Synodontis schall harvested from Otuogori River in Ogbia Local Government Area, Bayelsa State. Forty (40) samples of S. schall were collected and examined in the laboratory using standard procedures. Out of this population, a total of 4 S. schall were positive to various intestinal helminthes, giving an overall prevalence of 10%. Three (3) helminth parasites; Diphyllobothrium spp. (50%), Capillaria philippinensis (25%) and Contracaecum species (25%) were recovered. Female fishes, 3 (15%), were more infected than male fishes 1(5%). Based on actual length, fishes measuring 15.0-20.9cm were more infected (33.33%) than those measuring 21.0-25.9cm (8.70%). Fishes that weighed between 50-100g had a prevalence of 15.38% while those that weighed 101-150g had a prevalence of 11.76%. The result of this study showed relatively low prevalence of fish parasites in the study area. The discrepancy in age-related and physiological distinctive parasitism was shown not significant statistically (P>0.05). Due attention should be paid by the relevant bodies to prevent the upsurge of parasites' burden in fishes harvested and sold in this area by educating vendors and the consumers at large.

Key words: *Fish, Synodontis, gastrointestinal, helminthes, Bayelsa*

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I. Introduction

Fish is a low-fat food and a great source of protein, vitamins and minerals and over the years, aquaculture has gained a rapid interest due to the importance of fish as a cheaper and healthy source of protein [1, 2]. Fish and fish products play a significant role in the diets of the populations of West African countries, and constitute more than 60% of the total protein intake in adults especially in the rural areas [3, 4].. *Synodontis schall* is a catfish belonging to the family *Mockokidae*. *S. schall* has been shown to be rich in moisture, dry matter, protein, lipid, vitamins, minerals and caloric value, thereby, increasing its acceptability and demand by fish consumers [5]. *S. schall* is generally called the Nile Squeaker and Upside-down catfish by the locals because of its characteristic ability to swim with its stomach facing up.

Fishes are a major food source especially in the Niger-Delta of Nigeria with *S. schall* being a favorite delicacy of the people of Ogbia Local Government Area of Bayelsa State, Nigeria. *S. schall* is one of the endemic economically important fish species in Ogbia region of Bayelsa State Nigeria. It contributes a significant percentage in the catches of artisanal fisheries and is known by the common name 'Ikpoki'. The fish species is cherished in the study area because of its availability, excellent taste and meat quality; and is mainly utilized in the preparation of plantain pepper soup.

Fish is susceptible to a large array of parasites [2] and most either in the wild or cultured serve as routes of infections to human (Zoonoses). Majority of the parasites found in the fish are intermediate stages and must be transmitted to their definite hosts (animals and humans) for completeness of their lifecycles [2]. Most parasites exhibit various strategies for adaptation to their hosts, with many of the parasitic species being host specific to some extent and capable of infecting one or only a linked number of host species [6]. Individual parasites species may infect different host species with differing effects [7]. They can infect fishes in different stages of their life, as well as different aquatic environmental conditions. Their presence is considered to be biological indicators of environmental pollution [6]. Parasites interfere with the nutrition, metabolism and secretory function of the alimentary canal, damage nervous system and also upset the normal reproduction of the host, reducing yield [8, 9]. Apart from their adverse effect on fishes, parasites often cause serious outbreaks of

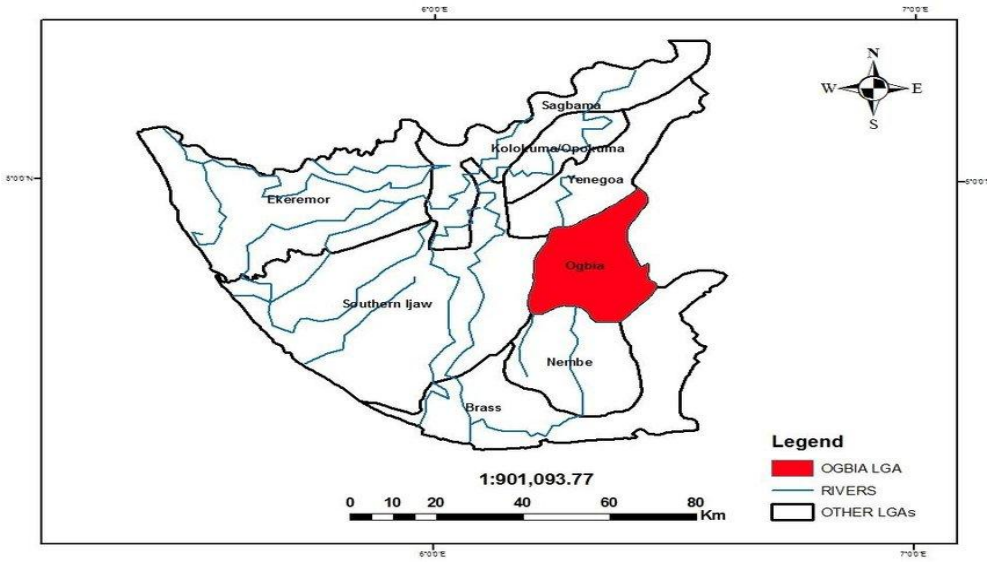
disease when consumed by a susceptible human host [7]. Due to the high demand for fish and fisheries products for protein security, it becomes pertinent to determine the parasite status of common economically important fish species. Information obtained from these studies would provide base line data to consumers, policy makers and aqua-culturalists [3].

II. Material and Methods.

Study Area

The study was conducted in Otuogori community in Ogbia Local Government of Bayelsa State. The study area is located at Latitude 4.819194 and Longitude 6.26292. The Otuogori River is a freshwater body which is a part of the lower River Nun water system that arose from River Niger and empties into the Niger Delta. Otuogori community is with mangrove forest vegetation and a tropical climate comprising of long wet season between April to November, a cold, dry and dusty harmattan period between December and January and a dry season between February and March. The major occupation of individuals within the study area is fishing, logging and subsistence farming.

Figure 1., Map of Bayelsa State, showing Ogbia Local Government Area [10].



Sample Collection and Identification

All samples used were live samples bought from fishermen along the river banks upon their return from morning fishing. The fish samples were immediately transferred individually to well aerated mini-fish tanks containing river water and transported to the laboratory for further analysis. Identification of *S. schall* was based on identification key given by [11]. Differentiation of sexes was based on external features (anal opening) and internal features such as gonad [12]. The actual lengths of the fishes were measured with the aid of a thread and meter rule from the snout to the base of the caudal fin to the nearest 0.1cm. The standard length was measured after removal of the head and caudal fin with a measuring board to the nearest 0.1cm.The weight of the fishes was measured using an electronic weighing balance.

Examination of *S. schall* for Endoparasites.

Individual fish sample were laid dorsally on the dissecting board covered with aluminum foil and cut open ventrally. The internal organs and visceral cavities were examined insitu with an x4 hand lens for any motile macro parasites. The internal organs (intestine, liver, gonads etc.) were isolated with the aid of forceps and surgical scissors into petri dishes containing normal saline. The intestine was then macerated using a scalpel, 2ml of formal saline was added and allowed to stand for 5minutes to settle before filtering the aliquot using a 24µm aperture mesh. The aliquot was stored in a 10ml universal Vail, then 0.1ml of this was used to prepare a wet mount. The remaining residue was analyze using the concentration technique as described by [13].The product of the centrifugation was used to prepared a smear stained with Lugol's iodine and viewed with x10 and 40 objectives of the microscope according to [14]. Parasites were identified with the aid of fish parasite guides by [15] and [16].

Data Analysis

The collected raw data was entered into Microsoft excel data sheets and analyzed. Descriptive statistics was employed and expressed in terms of frequency and percentage. Significance of the result was tested at <0.05.

III. Results

A total of 40 fish samples (20 males and 20 females) were examined and 4 (10%) were infected. The infected comprised two samples each from the 15.0-20.9 cm and 21.0-25.9 cm total length classes manifesting 33.33% and 8.70% prevalence respectively while no infection was recorded for the total length class; 26.0-30.9cm (Table 1).

According to sex, Female fish samples were more infected than males. 1(5%) of the 20 males examined was infected while 3 (15%) of the 20 females examined were positive to various parasites (Table 1).

Table 1., Prevalence of Gastrointestinal Parasites based on Actual Length of *S. schall.*

Actual Length (cm)	No Examined (%)		No infected (%)		Overall Total Infected (%)
	Female	Male	Female	Male	
15.0-20.9	3(15.0%)	3(15.0%)	2(66.7%)	0	2(33.3%)
21.0-25.9	10(50.0%)	13(65.0%)	1(10%)	1(7.69%)	2(8.70%)
26.0-30.9	7(53.0%)	4(20.0%)	0	0	0
Total (%)	20	20	3(15.0%)	1(5.0%)	4(10.0%)

The weight of the fish samples showed that 13 of the examined weighed between 50-100g, out of which 2 were infected with a prevalence of 15.38%, while of the 17 fish samples that weighed between 101-150g, only 2 were infected giving a prevalence of 11.76%. Those that weighed between 151-200g had no infection (Table 2).

Table 2., Prevalence of Gastrointestinal Parasites Based on Weight of *S. schall.*

Body weight (g)	No Examined (%)		No infected (%)		Overall Total infected (%)
	Female	Male	Female	Male	
50-100	7(35.0%)	6(30.0%)	2(28.57%)	0	2(15.38%)
101-150	8(40.0%)	9(45.0%)	1(12.5%)	1(11.11%)	2(11.76%)
151-200	5(25.0%)	5(25.0%)	0	0	0
Total (%)	20	20	3(15%)	1(5%)	4(10.0%)

Three species of parasites were recovered in the study: *Diphyllobothrium* spp., *Capillaria philippinensis* and *Contracaecum* spp. *Diphyllobothrium* spp., infected 2 fish samples, *Capillaria philippinensis* infected one, while *Contracaecum* spp. was recovered from one fish sample (Figure 2).

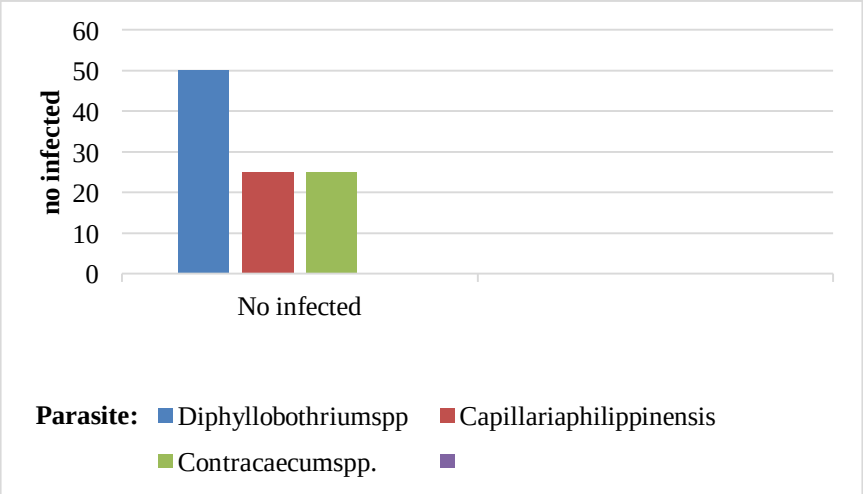


Figure 2., Parasites species recovered from fish samples

IV. Discussion

The study showed that fish parasitism in the wild is not intense as the general overall infection load of fish specimens was reasonably low 4 (10.0%). This may be due to the wide spatial range the fish covers that may limit effective infection of the host by the infective stages of the parasites. The study also showed the

discrepancy in age-related and physiological distinctive parasitism to be very low and not significant statistically (P>0.05). There was a trend that revealed that age had a declining influence on parasitism with the longer and older fish samples harboring no parasites at all [17, 18, 12]. Female fish samples harbored more parasites than the male, which was attributed to host specific factors depicting a clear gender relationship in the occurrence of parasites in upside-down fish. This agrees with the findings of [19] and [20] who also reported the occurrence of more parasites in the female fish than in the males. Other researchers opined that differences in parasitic infestation in relation to sex are physiological [21]. [20] postulated that females may be more susceptible to parasitic infection because of their higher metabolic rate and greater activity.

The study indicates that the fish species was not a suitable host to an array of parasites and builds immunity as age increases, an opinion the researchers hold due to the relatively low prevalence of helminthes and other parasites in the sampled fishes. This trend in the parasite dynamics was not in agreement with numerous studies that supported increased in parasite density as age of fish host increased [8, 9, 4]. However, when the economic importance of the river system is considered, it is imperative to state that the low prevalence of parasites and the relatively poor growth indices recorded in the fish samples (length and weight) may have been due to the polluted state of the environment. Also, the poor manifestation of parasites in the sampled fish could be due to the peculiarities of the environment or water body where they were obtained. Investigations revealed that Otuogori River serves the community in numerous purposes such as domestic needs (drinking, washing, refuse dump and defecation) thus, influencing the biodiversity of the water body [8, 9]. The effluents that are generated are opined by this research to be impacting negatively to the parasites ability to secure active infection [22]. On the other hand, it would be expected that such a polluted environment would promote parasite infectivity, however, the occurrence of the infective stages of the recovered parasites' as free living makes them susceptible to denaturing and loss of integrity by the detergents and other chemicals released into to the water body.

Diphylobothrium spp. and *Contracaecum* spp., are common parasites of cat fish according to numerous studies [23]. The presence of these organisms, *Contracaecum* Spp., *Diphylobothrium* Spp.,and *Capillaria philippinensis* may be a factor responsible for the low weight and length recorded in the affected fishes as these organisms utilize food in the body of the fishes, depositing toxic metabolites which can lead to growth stunting [9, 4, 21]. A similar observation was made by [24] who recorded a decrease in length and weight in parasitized fishes. This trend appears to be common especially in upside-down catfish as a study at the confluence of the River Niger and Benue by [25] had fishes only in the lower weight and length classes parasitized. The presence of the Broad fish tape worm; *Diphylobothrium* strongly buttresses the public health risk of consuming improperly cooked *Synodontis schall* as it presents a zoonotic threat.

V. Conclusion

The study shows that fish parasitism of *S. schall* in the wild is not intense in the study area due to the mitigating effect of chemical and organic pollution which also may have impacted the breeding of the host fish. This research is not stating absolutely that the *S. schall* is not suitable to other common helminthes of fish rather the peculiarities of the environment indicates to influenced biodiversity of the water body. Parasitism in *S. schall* is sex related and age helps the animal to build immunity which dilutes the zoonotic threat of *Diphylobothrium* Spp., infected fish as marketable sizes of the fish species are likely to be well sort after. This study highlights the prevalence and diversity of the parasites in *S. schall* and will guide the consumers and public health policy makers on the quality of fishes harvested from Otuogori River. This will create awareness on the problem of gastrointestinal parasites in fishes and will inform policy decisions in reducing the health and economic burden associated with the consumption of contaminated fishes.

Conflict of interest

The authors have declared no conflict of interests.

References

[1]. Dorny, P., Praet, N., Deckers, N. and Gabriel, S. 2009. Emerging food-borne parasites. *Veterinary Parasitology, 163*:196-206.

[2]. Shinn, A. P., Pratoomyot, J., Bron, J. E., Paladini, G., Brooker, E. E. and Brooker, A. J. 2015. Economic costs of protistan and metazoan parasites to global mariculture. *Parasitology, 142*: 196–270.

[3]. Bakke, T. A., Cable, J. and Harris, P. D. 2007. The biology of *Gyrodactylid* monogeneans: "the Russian-doll killers". *Advanced Parasitology, 64*: 161–218.

[4]. Sikoki, F. D., Nzeako, S. and Nchege, B. 2013. Evaluation of Nematode Parasitemia in *Oreochromis niloticus* from Lower New Calabar River, Port Harcourt, Niger Delta, Nigeria. *International Journal of Scientific Research in Environmental Sciences (IJSRES), 1(10)*: 263-267.

[5]. Steffens, W. 2006. Freshwater fish - wholesome foodstuffs. *Bulgarian Journal of Agricultural Science, 12*: 320-328.

[6]. Bari, L. and Yamazaki, K. 2018. *Seafood Safety and Quality.* CRC Press. UK. pp 144

[7]. Roberts, R. J. 2012. The parasitology of teleosts. *In*: *Fish Pathology*, Fourth Edition. Blackwell Publishing Ltd.

[8]. Awharitoma, A. O., and Ehigiator, F. A. R. 2012. Helminth parasites of fishes from some rivers in southern Nigeria. *African Scientist, 13(2),* 65-69.

[9]. Nzeako, S., Uche, A., Imafidor, H., Abraham, N. 2014. Endoparasitic fauna of *Chrysichthys nigrodigitatus* (Lacepede, 1802) in the new Calabar river, Choba, Rivers State, Nigeria, *International Journal of Fisheries and Aquatic Studies, (IJFAS) 1(6)*: 208-212
[10]. Abadom, C. D. and Nwankwoala, H. O. 2018. Interpretation of Groundwater Quality Using Statistical Techniques in Federal University, Otuoke and Environs, Bayelsa State, Nigeria. *World Scientific News.* 95: 124-148.
[11]. Fischer, W., Blanchi, G. and Scott, W. B. 1981. *FAQ species identification sheets for fishery area 7,* Canada found in trust Ottawa, Canada. Pp 34- 47.
[12]. Eyo, J. E., Iyaji, F. O. and Obiekezie, A. I. 2013. Parasitic infestation of *Synodontis batensoda* (Rüppell, 1832, Siluriformes, Mockokidae) at Rivers Niger-Benue Confluence, Nigeria. *African Journal of Biotechnology, 12 (20)*: 3029-3039.
[13]. Cheesbrough, M. (2005) District Laboratory in Tropical Countries, Part 1. 2nd Edition, Cambridge University Press, Cambridge.
[14]. Uche, A., Sikoki, F. and Nzeako, S. 2014. Endoparasitaemia of *Chrysichthys nigrodigitatus* in a Tidal Freshwater Body in the Niger Delta, Nigeria *International Journal of Scientific Research in Environmental Sciences*, *2(7)*: 250-260
[15]. Zdenek, L. 1977. *Methods for the Diagnosis of Fish Diseases*. Amerind Publishing Company PVT. Ltd., New Delhi. Pp. 1-135.
[16]. Williams, E. H. and Bunkley-Williams, L. 1996. Parasites of offshore big game fish of Puerto Rico and the Western Atlantic. Puerto Rico Department of Natural and Environmental Resources, San Juan, Pr, and the University of Puerto Rico, Mayaguez, PR, 382 p.
[17]. Poulin, R. 2000. Variation in the intraspecific relationship between fish length and intensity of the parasitic infection: Biological and statistical causes. *Journal of Fish Biology, 56*: 123-137.
[18]. Ekanem, A. P., Eyo, V. O., Ekpo, I. E., Bassey, B. O. 2013. Parasites of Blue Crab (*Callinectesamnicola*) in the 43 Cross River Estuary, Nigeria. *International Journal of Fisheries and Aquatic Studies*, *1(1)*: 18-21.
[19]. Aloo, P. A., Anam, R. O., Mwangi, J. N. 2004. Metazoan parasites of some commercially important fish along the Kenyan Coast. *Western Indian Ocean Journal of Marine Science*, *3(1)*: 71-78.
[20]. Alam, M. J., Rakibuzzaman, M., and Hasan, M. M. 2010. Comparative study of endo-parasitic infestation in Channa punctatus (Bloch, 1793) collected from Hatchery and Sewage lagoon. *Nature and Science, 8(5)*: 152-156.
[21]. Iyaji, F. O. and Yaro, C. A. 2016a. Monthly occurrence of nematode parasites of Synodontis species from rivers Niger-Benue confluence at Lokoja, Nigeria. *International Journal of Fisheries and Aquaculture, 4(5):*36-40
[22]. Adam, H. M., Samia, H., and Sayied, A. S. 2009. Protozoan Parasites of two freshwaterfish species (*Oreochromis niloticus*and *Clariasgariepienus*) in Khartoum State (Sudan). *Sud. J. Vet. Sci. Anim. Husb., 48 (1 and 2)*: 44-50.
[23]. Effanga, E. O. and Eyo, V. O. 2018. Prevalence of parasites in Nile Squicker *Synodonctis schall. Asian Journal of Advances in Agricultural Research, 6(3)*: 1- 10.
[24]. Omeji S, Obande RA and Gbem BO 2018. Effect of helminth parasitic load on the length weight ratio of Synodontis resupinata from rivers Mu and Benue, Makurdi, Nigeria. *International Journal of Fisheries and Aquatic Studies; 6(4*): 540-544
[25]. Iyaji, F. O. and Yaro, C. A. (2016b). Endoparasitic helminths of *Synodontis schall* (Blochandschneider, 1801, siluriformes, mochokidae) at the confluence of Niger and Benue Rivers, Lokoja, Nigeria. *International Journal of Fisheries and Aquatic Studies, 4 (5)*: 30-35

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