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PREVALENCE OF GASTROINTESTINAL HELMINTH PARASITE OF *PARACHANNA OBSCURA* AND *HETEROTIS NILOTICUS* AT RIVER ANAMBRA, ANAMBRA STATE

***[1]Nwadike, C. C., [1]Onogu, A. A., [1]Ekeruo, I. J., [1]Olisa, C. S. and [2]Osaji–Nwafili, P. N.**

[1]Department of Zoology, Nnamdi Azikiwe University Awka, Anambra State, Nigeria.
[2]Department of Animal and Environmental Biology, Delta State University, Abraka, Nigeria.

*Corresponding authors' email: nc.chidiogo@unizik.edu.ng Phone: +23486001794

ABSTRACT

Parasitic infections are one of the factors limiting fish in the wild for sustainable productivity. The study was carried out to determine the gastrointestinal helminth parasite associated with *Parachanna obscura* and *Heterotis niloticus* and their prevalence concerning sex and size (length and weight). Sixty (60) fishes (30 *H. niloticus* and 30 *P. obscura*) were bought from fishmongers from the Anambra River. They were examined through dissection and observation of the alimentary canal under the microscope's objective lens. The overall prevalence of the parasites in *Heterotis niloticus* was 83.33%. The parasites recovered were *Tenuisentis niloticus* 16 (53.33%), *Sandonella sandoni* 8 (26.67%) and *Capillaria* species 1 (3.33%). There was no significant difference in the prevalence of gastrointestinal helminth among the sexes ($p > 0.05$). However, the parasite species had a significant difference in prevalence ($p < 0.05$). In *P. obscura*, the overall prevalence of the parasite was 73.33% and only one parasite species, *Procamallanus* species was recovered. There was no significant difference in the prevalence of gastrointestinal helminth among sexes ($p = 0.096$, $p > 0.05$) and fish size. Further studies are required to consider the probable zoonotic transmission of parasitic diseases from fish. It concluded that the prevalence of gastrointestinal helminth parasites of these species is high and this may affect the fish quality.

Keywords: Gastrointestinal, Parasites, *Heterotis niloticus*, *Parachanna obscura*, Anambra, Nigeria

INTRODUCTION

The growing concerns about fish parasites arise from the ever-increasing demand for fish as a premium source of protein, vitamins, minerals, and omega-3 fatty acids. The fatty acids are heart-friendly and can improve brain development and reproduction. (Ajah *et al*., 2020). Generally, fish has been the most important and sustaining factor for people around the world (Ayuba *et al.,* 2016). However, the greatest setback to aquaculture and its growth has been fish parasites and diseases (Odon Esther *et al*., 2015). Fish can be infected with many parasites, some of which might be harmful in certain situations, much like any other wild animal. They often produce disease conditions in fish, increase their susceptibility to other diseases, and cause nutritive devaluation of fish and fish loss (Obano *et al.,* 2010).

The African snakehead, *Parachanna obscura*, is an emerging aquaculture candidate in Nigeria and the sub-Saharan region as a whole. It is preferred for its palatable fillet and strong flesh integrity, and because the species is high in protein and fat contents thereby making it a good healing agent for post-operation patients. (Adegbehingbe & Umezurike, 2018). In Nigeria and the Eastern part of Nigeria, several gastrointestinal helminth worms have been documented to be present and isolated from this fish by Ogbulie *et al*. (2003). They reported the occurrence of *Camallanus* species, *Capillaria* species, *Acetodoxtra* species, *Clinostomum* species, *Diplostomum* species, and *Polyonchobothrium* species.

African snakehead and other fish species are known to be hosts of parasites and diseases. Akinsanya *et al*. (2007) reported on parasites of *Parachanna obscura*, from Lekki Lagoon, Lagos to include two helminthes, *Procamallanus* sp (Spirocamallanus) and *Contracaecum* sp, and a trematode, *Clinostomum metaceria*. The African bony tongue, *Heterotis niloticus*, is a freshwater fish widely distributed in tropical rivers and freshwater lakes of Western and Central Africa, and the Nile Basin, where it supports important commercial and subsistence fisheries. They also play host to several parasites as recorded by Ayuba *et. al.* (2016).

However, no significant harm has been identified or ensued in most fishes infested with parasites. Thus, there are only a few reports of parasites causing mortality or serious damage to fish populations, this may be largely because such effects go unnoticed (Ayuba *et al*., 2016). Consumption of raw/ or undercooked fish by humans may also increase the chances of parasitic zoonoses. Therefore, consumers should take common precautions including obtaining seafood from reputable sources especially if the seafood is to be consumed uncooked. Adequate cooking is the safest way to prevent related infections in humans. Hence, this paper is aimed at identifying the parasites of *P. obscura* and *H. niloticus* from the lower River Benue and to provide information on the prevalence of these parasites and their relation to sex and body size.

MATERIALS AND METHODS

Study area

The study was conducted in the Anambra River, Southeastern, Nigeria. It is a major tributary of the River Niger. Anambra River Basin lies between latitudes $6^{0}10^{1}$ and $7^{0}8^{1}$ N and longitudes $6^{0}30^{1}$ and $7^{0}15$E (mapcarta.com). The basin has an annual rainfall between 150cm-200cm. The area has a low altitude of under 1000 above sea level. Temperatures are uniformly high with a small annual range of 5-10^{o}C. The study area is one of the richest areas for agricultural and fishery production in Nigeria (Mutter, 1978), thus agriculture and fishing form the dominant occupations of the local people. These two major economic activities are closely geared to the two seasons of the year (wet and dry seasons).

Collection, identification, and processing of fish samples for parasite examination

Sixty (60) specimens, (30 each) of *P. obscura* and *H. niloticus* were purchased from local fishermen and fishmongers at

Otuocha market, Anambra state. Fresh dead fishes were immediately put into a plastic container with an ice block to retard decomposition and transported to the Parasitology laboratory of the Department of Zoology, Nnamdi Azikiwe University, Awka for examination.

Fish samples were identified at the species level using taxonomic keys (Holden and Reed, 1972). The weights were recorded to the nearest gram using Adams electronic weighing balance; model AQP 1600 while the lengths of the fishes were determined using a measuring board calibrated in centimeters. The sexes of the fish were determined by examination of their papillae and were also determined after dissection (Martinez-Aquino *et al*., 2004).

The gastrointestinal tract was all removed and each section of the gut was placed in saline water contained in Petri dishes to aid the emergence of parasites. The Petri dishes were then thoroughly examined for parasitic helminths. The recognition of the worms was enhanced by the wriggling movements on emergence (Nwadike, *et. al.,* 2023a).

Identification of parasites

Parasites seen were picked up with a small paintbrush. Cestode parasites were relaxed in the distilled water for ten minutes. (Olurin *et al.,* 2012) and preserved in 70% alcohol. With the acanthocephalans, the distilled water also caused the proboscis to be extended. An applicator rod was also used to exude the proboscis of the acanthocephalans. After relaxation parasites were killed and fixed in Alcohol-Formalin-Acetic acid (AFA) solution. The parasites were left in the fixative for 24 hours and then transferred to a 70% alcohol solution. (Olurin *et al*., 2012). The number of parasites per fish was recorded along with the site/location from which each parasite was collected. The parasites were identified using keys developed by Yorke and Mapplestone (1926), Yamaguti (1963), and Idodo-Umeh (2003).

Data Analysis

The chi-square test was employed to show the significant relationship in the prevalence of the gastrointestinal helminth in the sex, length, and weight of the fish.

RESULTS AND DISCUSSION

Out of the 60 specimens examined, 47 (78.33%) had a parasitic infection (25 (83.33%) *H. niloticus* and 22 (73.30%) *P. obscura*). Four parasites were recovered from host species: *Capillaria* sp, *Procamallanus* sp (nematode); *Sandonella sandoni* (cestode), *and Tenuisentis niloticus* (acanthocephalan).

Table 1 shows the prevalence of gastrointestinal helminth parasites recovered from *H. niloticus* and *P. obscura*. The highest parasite prevalence was recorded in *P. obscura* infected with *Procamallanus* sp. In *H. niloticus, Tenuisentis niloticus* had the highest prevalence. The result of data analysis shows a significant difference in the prevalence between the parasite species identified in *H. niloticus* (χ^2 = 18.720, df = 2, P = 0.000) as shown in Table 1 below.

The relationship between parasite prevalence and sex is shown in Table 2. Male species of *H. niloticus* had a higher prevalence compared to the females, yet there was no significant difference in prevalence of helminth infection between the male and female **(**p>0.05). Similarly, there was no difference (p>0.05) in parasite burden with sex in *P. obscura*.

Table 3 shows the prevalence of infection in relation to the length *of H. niloticus* and *Parachanna obscura*. The length groups 16.5 - 22.4cm recorded the highest prevalence of 100.00% while the length groups 22.5 - 26.4cm had the lowest prevalence (62.50%). There was no significant relationship between size and parasite prevalence was observed (0.229; p>0.05).

Similarly, there was no relationship (p>0.05) between parasite prevalence and length of *Parachanna obscura*.

The weight groups 185.5 - 250.4g recorded the highest prevalence of 92.30% while the weight groups 54.5 - 120.4g had the lowest prevalence of 50.00% in *H. niloticus.* No significant relationship between weight and parasite prevalence was observed (0.252; p>0.05) (Table 4).

Likewise in *P. obscura*, there was also no relationship (p>0.05) between parasite prevalence and weight.

Table 1: Helminths associated with *Heterotis niloticus* and *P. obscura* in Anambra River

Fish species	Parasite sample	Number Examined	Number Infected (%)	p Value
Heterotis niloticus	*Capillaria spp*	30	1 (3.33)	0.000*
	Sandonella sandoni	30	8 (26.67)	
	Tenuisentis niloticus	30	16 (53.33)	
Parachanna obscura	*Procamallanus* sp	30	22 (73.33)	

(χ^2 - 18.720, df – 2) * - Significant at p<0.05.

Table 2: Parasite prevalence in relation to sex

Fish Species	Sex	Number Examined	Number Infected (%)	p Value
Heterotis niloticus	Male	15	13 (86.67)	0.624
	Female	15	12 (80.00)	
		30	**25 (83.33)**	
Parachanna obscura	Male	11	10 (90.91)	0.098
	Female	19	12 (63.16)	
		30	**22 (73.33)**	
Overall	Male	26	23 (88.46)	0.096
	Female	34	24 (70.59)	
		60	**47 (78.33)**	

(χ^2 – *H. niloticus* 0.240, df – 1; *P. obscura* χ^2 - 2.744, df – 1; overall χ^2 - 2.773, df – 1)

Table 3: Parasite prevalence in relation to length of *Heterotis niloticus* and *Parachanna obscura*

Body length (cm)	Number examined	Number infected (%)	p Value
		Heterotis niloticus	
16.5 - 22.4	1	1 (100.00)	0.229
22.5 - 26.4	8	5 (62.50)	
26.5 - 30.4	17	16 (94.10)	
30.5 - 34.5	4	3 (75.00)	
Total	**30**	**25 (83.30)**	
		Parachanna obscura	
10 -14	1	1 (100.00)	0.166
15 -19	10	5 (50.00)	
20 -24	16	14 (87.50)	
25 -29	2	2 (100.0)	
30 -34	1	0 (0.00)	
Total	**30**	**22 (73.33)**	

H. niloticus **(χ^2 -**4.324, df - 3**);** *P. obscura* **(χ^2 -** 6.488, df – 4)

Table 4: Parasite prevalence in relation to the weight of *Heterotis niloticus* and *Parachanna obscura*

Body weight (g)	Number examined	Number infected (%)	p Value
		Heterotis niloticus	
54.5 - 120.4	4	2 (50.00)	0.252
120.5 - 185.4	8	7 (87.50)	
185.5 - 250.4	13	12 (92.30)	
250.5– 330.0	5	4 (80.00)	
Total	**30**	**25 (83.30)**	
		Parachanna obscura	
50 -90	8	5 (62.50)	0.381
91-130	11	8 (72.72)	
131-170	4	4 (100.00)	
171-210	4	2 (50.00)	
211-250	3	3 (100.00)	
Total	**30**	**22 (73.33)**	

H. niloticus **(χ^2 -** 4.094, df - 3**);** *P. obscura* **(χ^2 -** 4.188, df – 4)

Discussion

This study revealed a significant difference in the prevalence between the parasite species identified in *H. niloticus*. This can be further explained by the fact that *Tenuisentis niloticus* recorded a higher prevalence of 53.33 % compared to the other parasite species. *Tenuisentis niloticus* could be said to be a regular parasite of *H. niloticus* (Nwadike *et al.,* 2023a). The occurrence of *Procamallanus* species in *Parachanna obscura* conforms to the work done by Akinsanya and Hassan (2002) and Adegbehingbe and Umezurike (2018). The feeding habits of fish often determine the host-specificity of their parasites. Nematoda of the genus *Procamallanus* (Camallanidae, Procamallaninae) are predominantly parasites of freshwater fish (Moravec 1998). Thus, the recovery of this parasite in *Clarias gariepinus* by Banyigyi *et al.* (2023) from River Nasarawa conforms.

The relationship between host sex and helminth infection showed that males of both species had a higher prevalence than females although infections were not significant. This agrees with Oden Esther *et al.* (2015) and Aloo (2007; 2004) but disagrees with the works of Ayuba *et al*.(2016), Omeji, et al. (2011), and Emere and Egbe (2006) where female fishes were observed to have the higher percentage of parasites than the male. This could be due to territoriality. Also, the main reason for the differences in parasitic load with sex is thought to be physiological. (Oden Esther *et al*., 2015)

The non-significant relationship recorded between size (length) and helminth infection in *H. niloticus* agrees with Adegbehingbe and Umezurike (2018). On the other hand, there was no significant relationship between helminth infection and the length of *Parachanna obscura*. This result agrees with Oden Esther *et al,* (2015) who reported no significant difference in prevalence by the size of the fish. The result however did not agree with Osho (2017) who reported a positive correlation between helminth species and the increasing length of the fish.

There was no relationship between helminth infection and weight. Thus, the infection does not depend on the weight of the fish. It is more or less accidental and could be attributed to the random selection of the fish.

CONCLUSION

The finding from the present study showed that there was a high prevalence of helminth parasites in both fish species examined, although the highest prevalence was recorded in *P. obscura.* The males of both species also recorded a higher prevalence than the females yet there was no difference in parasite burden with sex in *P. obscura*. Similarly, no significant relationship between size, weight, and parasite prevalence was observed. Further investigations are required to ascertain the possibility of zoonotic transmission of parasitic diseases from the fish species due to their economic importance in the area as a major fish species consumed by the people.

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