

Seasonal Variation in Endoparasite Loads in Four Fish Species from Lower River Benue, Makurdi Nigeria

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Abstract: *Citharinus citharus*, *Heterobranchus bidorsalis*, *Synodontis clarias* and *Heterotis niloticus* were examined for Endoparasites from June to January. A sample size of 160 fish each, for the four fish species were analysed. Two species of parasites were recovered; *Eustrongylides sp* (Nematode) and *D. latum* (Cestode). *Eustrongylides sp.* was prevalent > 90% in all the fish species. All the parasites were recovered from the gastrointestinal tract. *Synodontis clarias* had the highest mean parasites load of $5.27.78 \pm 0.75$ in the stomach and 2.85 ± 0.49 in the intestine during the dry season.

Keywords: *Synodontis clarias*, Parasites, *Eustrongylides*, Gastrointestinal, Dry and Wet Seasons.

Introduction

Fish production and productivity is affected by several factors including parasites. They are host to diverse parasites and their infections significantly affect fish behaviour, metabolism, body condition, fecundity or survival (Lafferty 2008). In a fish community, different fish species can exhibit broad variation in sensitivity to parasite infection. Three major factors play essential roles in host vulnerability and infection levels among fishers; host-parasite co-evolution, exposure to parasites and host suitability (Holmes, 1990). Others are temperature, increase in organic matter, pH and oxygen.

Also, seasons have varied effects on parasites infections, both prevalence and intensity. Seasons are associated with rainfall intensity, variation in pollutant, abundance of insects, flood, increase in domestic sewage (Hammida, 1991). Rainfall intensity may lead to Eutrophication which raises the level of intermediate hosts, which are food to fish. It increases parasitism in fish. This study is aimed at investigating variation of body parameters and parasite load by seasons.

Materials and Methods

Experimental Site

Fish were sampled from June to January at Ijaha I and II, modern market ward landing site and Wadata market all situated along River Benue at Makurdi, Benue State. The state is located in the Southern Guinea Savannah of Nigeria. The river is a major tributary of river Niger. Its' own tributaries are Rivers Katsina –Ala and Donga.

Preparation of Specimens

A total of 640 specimens of fish belonging to four families; *Citharinus citharus* (Citharinidae), *Heterobranchus bidorsalis* (Claridae), *Synodontis clarias* (Mochokidae) and *Heterotis niloticus* (Osteoglossidae) were transported in water jars to the laboratory, fisheries Department, University of Agriculture, Makurdi. Body parameters were taken. The ventral surface of fish was cut open from the mid ventral position of the body at the anal region to the mouth for examination of Endoparasites. The surface lining of the body cavity outer surface of visceral organs; stomach, intestine, liver were examined for encysted larvae and helminths. The organs were removed split open by a pair of scissors and the blunt end of the scalpel used to scrap to dislodge the parasite and put in a 0.75 of Saline solution. The recovered parasites were identified using the keys of Paperna (1991) and Paulder *et al.* (2011).

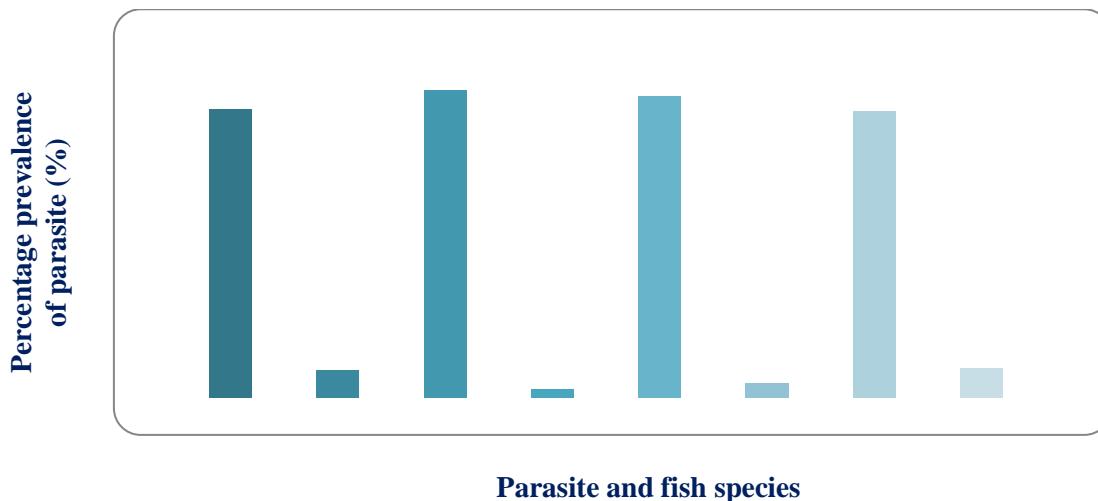
Data Analysis

The prevalence of parasites was analysed in percentages. T-test, was used for differences between the means. All data was analysed using minitab, 17th edition.

Results

Prevalent Endo-parasites

The result of prevalent parasites in the four fish species is presented in the Histogram (Fig.1). Two parasites *Eustrongylides sp.* (Nematode) and *D. latum* (Cestode) were isolated. *Eustrongylides sp.* was prevalent at 97.5% in *Heterobranchus bidorsalis*, 95.6% *Heterotis niloticus*, 91.3% *Citharinus citharus* and 90.7% *Synodontis clarias*. Mean while *D. latum* (Cestode) was prevalent at 9.3% *Synodontis clarias*, 8.7% *Citharinus citharus*, 4.4% *Heterotis niloticus*, and 2.5%. Meanwhile, *D. latum* was prevalent at 9.3% *Syndontis clarias*, 8.7% *Citharinus citharus*, 4.4% *Heterotis niloticus*, and 2.5% *Heterobranchus bidorsalis*.



Seasonal Variation in Length of Fish

Table 1 shows 160 specimen of each fish species consisted of different size groups. The mean length of *Citharinus citharus* was 28.07 ± 0.81 (dry) and 26.97 ± 0.82 (wet). *Heterobranchus bidorsalis* 32.01 ± 1.10 (dry) and 36.76 ± 1.01 (wet). In *Synodontis clarias* mean length was 28.76 ± 0.71 (dry) and 27.76 ± 0.71 (wet) mean while *Heterotis niloticus* had mean length of 30.40 ± 0.82 (dry) and 29.05 ± 0.75 (wet). This result indicate that variation in mean length was statistically significant in *Heterobranchus bidorsalis* since $P < 0.01$. This shows that length in the species varied with seasons. All other results were not statistically significant hence $P > 0.01$. It also shows that *Citharinus citharus*, *Synodontis clarias* and *Heterotis niloticus* had higher mean lengths in the dry season while *Heterobranchus bidorsalis* had higher mean length in the wet season.

Seasonal Variation of Body Weight

In Table 1, the mean body weight of the fish species shows that *Citharinus citharus* had mean body weight of 293.10 ± 11.10 (dry) and 267.20 ± 11.20 (wet). *Heterobranchus bidorsalis* had mean body weight of 491.90 ± 31.10 (dry) and 631.40 ± 34.70 (wet). In *Synodontis clarias* mean weight was 459.80 ± 23.50 (dry) and 346.40 ± 17.10 (wet). *Heterotis niloticus* had mean weight of 388.70 ± 23.00 (dry) and 256.30 ± 20.50 (wet). This result indicates that *C. citharus*, *S. Clarias* and *H. niloticus* had higher mean weight in the dry season. While *H. bidorsalis* had higher mean weight in the wet season. Seasonal variation of mean weight in *H. bidorsalis* and *Synodontis clarias* were statistically significant at $P < 0.01$.

Table 1: Seasonal Variation in Length and Weight of Fish

Fish species	Sample	Length			Weight		
		Dry	Wet	PV	Dry	Wet	PV
<i>Citharinus citharus</i>	160	28.87 ± 0.81	26.97 ± 0.82	0.10 ^{ns}	293.10 ± 11.10	267.20 ± 11.30	0.10 ^{ns}
<i>Heterobranchus bidorsalis</i>	160	32.01 ± 1.10	36.76 ± 1.01	<0.01**	491.90 ± 31.70	631.40 ± 34.70	<0.01**
<i>Synodontis clarias</i>	160	28.66 ± 0.80	27.77 ± 0.63	0.38 ^{ns}	459.80 ± 23.50	346.40 ± 17.10	<0.01**
<i>Heterotis niloticus</i>	160	30.40 ± 0.82	29.05 ± 0.75	0.22 ^{ns}	388.70 ± 23.00	256.30 ± 20.50	0.29 ^{ns}

** indicates statistically significant at 99% CL; * indicates statistically significant at 95% CL
ns indicate not significant.

Seasonal Variation of Parasites in Stomach

The result in Table 2 shows that in *C. citharus* mean parasite load was 1.88 ± 0.43 (dry) and 1.63 ± 0.48 (wet). *S. clarias* had mean parasite load of 5.27 ± 0.90 (dry) and 3.18 ± 0.65 (wet). *H. niloticus* had mean parasite load of 1.65 ± 0.45 (dry) and 0.77 ± 0.31 (wet). Parasite infection in the stomach of *H. bidorsalis* was statistically significant $P < 0.05$. This shows that parasite load in the stomach varied with seasons. All the other result were not significant at $P < 0.05$. However, the result shows that parasitic infection was more in the dry season in all the fish species.

Seasonal Variation of Parasite in Intestine

Table 2 shows that *C. citharus* had mean parasitic load of 0.77 ± 0.18 (dry) and 0.68 ± 0.20 (wet). In *H. bidorsalis*, the mean load was 2.60 ± 0.47 (dry) and 0.78 ± 0.20 (wet). *S. clarias* had 2.85 ± 0.49 (dry) and 1.67 ± 0.36 (wet). In *H. niloticus* mean load was 0.75 ± 0.21 (dry) and 0.76 ± 0.31 (wet). Intestinal parasites showed significant difference in the means of *H. bidorsalis* $P < 0.01$ and *S. clarias* $P < 0.05$. Intestinal parasites were higher in *S. clarias*, *H. bidorsalis* and *C. citharus* during the dry season.

Table 2: Seasonal Variation of Parasite Load in the Stomach and Intestine of Fish

Fish species	Sample	Stomach			Intestine		
		Dry	Wet	PV	Dry	Wet	PV
<i>C. citharus</i>	160	1.88 ± 0.43	1.63 ± 0.48	0.70^{ns}	0.77 ± 0.18	0.68 ± 0.20	0.75^{ns}
<i>H. bidorsalis</i>	160	0.42 ± 0.72	2.22 ± 0.52	$< 0.04^*$	2.60 ± 0.47	0.78 ± 0.20	$< 0.01^{**}$
<i>S. clarias</i>	160	5.27 ± 0.90	3.18 ± 0.65	0.06^{ns}	2.85 ± 0.49	1.67 ± 0.36	$< 0.05^*$
<i>H. niloticus</i>	160	1.65 ± 0.45	0.77 ± 0.31	0.11^{ns}	0.75 ± 0.21	0.76 ± 0.31	0.9^{ns}

** indicates statistically significant at 99% CL; * indicates statistically significant at 95% CL
ns indicate not significant.

Discussion

The study recorded high prevalence of *Eustrongylites sp.* ($> 90.00\%$) in all the fish species. Similar result was reported by Shola *et al.* (2016) on *Bagrus filamentosus* and *Citharinus citharus* in both the stomach and intestine. Fishes in the study had mean standard length range of 27.00cm – 34.00cm. This is slightly higher than the one reported by Omeji (2012)

that *O. Occidentals* and *Synodontis clarias* within the standard length range of 22 – 28cm, had higher prevalence of gastro intestinal helminth parasites. Other workers reported length range of below 29.00cm in *Citharinus citharus* (Shola *et al.*, 2016) 19 – 21cm on 48 fish species examined in Lake Uba and Ruwe Tanzania (Chacha, 2014), 20 – 30cm in *C. gariepinus* (Kawe *et al.*, 2016). Bagge *et al.* (2004) however stated that it is the host population size that matters or shapes the parasite population size but not the host body size or density. Fishes in the dry season were slightly longer than those in the wet season though it was not statistically significant. In *H. bidorsalis* mean length was higher in the wet season than in the dry season. This could be due to random sampling.

Fishes with body weight range between 500 – 600g have been reported for high prevalence of parasite which is similar to the findings in this work (Kawe *et al.*, 2016). Fish in the dry season had higher mean weight than those in the rainy season. This shows that weight is related to length. Higher mean value of parasites in *Synodontis clarias* agrees with the findings of Iyaji and Yaro (2016) who reported high prevalence of helminth parasite in *Synodontis sp.* at Lokoja. Auta *et al.* (1999) reported high prevalence in Zaria Dam. In this study all the parasites were recovered from the gastro intestinal tract. This agrees with Goselle *et al.* (2008) those helminth parasites have preference for regions of attachment in the alimentary canal.

Higher mean parasite infection occurred in the dry season in both stomach and intestine. This is in agreement with Asifa *et al.* (2016) who reported positive correlation between parasite and seasons. Fish condition was high since $P < 0.01$. The higher mean values were in the dry season, which means that they were in a better fitness during the period similar results were reported by Keri *et al.*, (2011) on *Oreochromis niloticus*.

Conclusion

A sample of 160 fish each for four fish species were examined for variation of parasites load in the dry and wet seasons. Two species of parasites, *Eustrongylides sp.* (nematode) and *D. latum* (cestode) were recovered from gastrointestinal tract of all the fish species. *Synodontis clarias* had the highest mean parasite load of 5.27 ± 0.90 and 2.85 ± 0.49 in the stomach and intestine respectively during the dry season.

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