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Prevalence of Intestinal Helminth Parasites in *Heterotis niloticus* in Marma Water Channel Along River Hadejia, Jigawa Nigeria

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Abstract
A study on the prevalence of intestinal parasites of Heterotis niloticus from Marma water channel, river Hadejia in Kirikasamma Local Government Area of Jigawa State was conducted from January to April 2015. Live fresh H. niloticus of different sizes and weight were obtained directly from fishermen at the landing site on monthly basis and transported in an ice box to the laboratory of Biological Science, Bayero University Kano for analysis. A total of 85 fishes of H. niloticus were examined during the study.The overall parasites prevalence was (22.4). Rate of infection in relation to sex was higher in male H. niloticus (22.4%) than in female H.niloticus (22.2%). H. niloticus with higher standard length and weight had the highest prevalence of (35.3%) and (50%) respectively. Four classes of helminth parasites were recovered namely cestode (12), trematode (1), nematode (6) and acanthocephalan (3). The research revealed that cestodes were more predominant with a total number of 12 parasites across.

Keywords: Intestinal parasites, *Heterotis niloticus,* prevalence.

INTRODUCTION
All fishes are potential host to many different species of parasites that causes significant mortalities among captive and wild fish stocks. Accurate identification of parasites is therefore important so that a build-up of parasite numbers can be prevented Goselle *et al*.(2008) Fish is the most parasitized animals among all vertebrates due to the nature of their physiological specialization, ecological situation. Meanwhile parasitic infection might have a remarkable effect on fish health in the world and on the amount of protein available to consumers; since protein is a vital human dietary requirement.

Therefore fish parasitology is a very important aspect in the development of aquaculture. Also a number of factors have been found to be responsible for the prevalence of these parasites in fresh waters, lakes and reservoirs.

Parasitic diseases of fish are of particular importance in the tropics. Parasites usually exist in equilibrium with their host as a survival strategy. However, in instances where hosts are overcrowded such as in aquaria or in fish farms, parasitic diseases can spread very rapidly causing great mortality (Paperna, 1996). Although this usually is not the case in the wild natural aquatic environments, it occurs when the environment is disturbed by human

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activity and interference e.g pollution which alters the natural distribution of their parasite communities (Imam, and Dewu, 2010).This study investigates the prevalence of intestinal helminth parasites in *H. niloticus* in Marma water channel along river Hadejia with a view to providing relevant information that could be useful in the attempt to combat the rate of economic losses experienced as a result of parasitic infestations.

MATERIALS AND METHODS

Study Area and Study Site

Marma water channel is situated along the river Hadejia in kirikasamma Local Government area, Jigawa State. It is located at latitude $12^{0}30'$N and longitude $10^{0}05$E of Green which meridian. Marma water channel covers a vast area in terms of flow its effects affect not only Kirikasamma Local government, but it affect both Hadejia, Birniwa, and Guri local government areas. River Hadejia has four (4) tributaries, they are: Kafin Hausa, Burum Gana, old Hadejia and Marma water channel. Due to deposition of sand and silt in the rivers which result in blockage and thereby reducing flows of the three (3) tributaries (Kafin Hausa, Burum Gana and old Hadejia). Therefore only Marma channel now carries all the discharges from Hadejia river into the non-returning Nguru lake (Bart, 2005).

Sample Collection

Live fresh specimens of *H. niloticus* of different sizes and weight were obtained directly from the local fishermen found working in the study area on monthly basis. Freshly killed samples were transported from the study area in an ice box to the laboratoryof Biological Science, Bayero University Kano, while live samples were transported in cooler containing water. These transportation measures are taken in order to maintain the natural form of the samples (Olatunde, 1977).

Study population

A total of 85 fishes were collected for the period of four months. The sample size were obtained as described by Lwanga and Lemeshow (1999) as:

$$n = \frac{Z^2 pq}{d^2}$$

n= Minimum sample

Z= Point of normal distribution curve equivalent to 95% confidence interval (1.96)

p= prevalence rate from previous study: 11.96% = 0.1196

q=1-p (constant)

Sample Examination

The total length of each sample was measured, from the tip of the snout to the extreme end of the caudal fin and it was measured using metre rule and was recorded to the nearest centimetres (cm). Also the body weights of the fishes were measured by placing the fish on a scale balance and readings were taken in grams (g) (Auta *et al.,* 1999).

Sex Determination

The external and internal reproductive structures were used in determining the sex of the various fish species (Olatunde, 1977).

Examination of Helminth Parasites

Collected samples were examined as described by Marcogliese (2002). Parasites recovered were observed using the taxonomic keys of Khalil *et al*., (1994), Gibson *et al*., (2005) and that of Paperna (1996).

Identification of Parasites

The intestinal contents were examined using binocular and dissecting microscope. The identification of the parasites was based on external morphology and general characteristics using the key provided by Paperna (1996). Thus, after isolating the parasite were preserved in 4% formalin solution, Paperna (1996).

Statistical Analysis

The data collected from the study area was analyzed using SPSS software (version 21).Chi-square test was used to examine whether the species and sex of fish were associated with prevalence of intestinal parasites. For all statistical analysis, a significant level (p-value) ofless than 0.05 was considered as statistically significant.

RESULTS

The overall prevalence of helminth infection in the fish species studied is presented in Table 1 below. A total of eighty five (85) fishes of *H. niloticus* were examined. Nineteen (19)out of 85 fishes which constitute (22.4%)were found to be infected with helminth parasites as shown in Table 1.

Prevalence of Helminth Parasites in *H. niloticus*

Results for helminth parasites obtained in *H. niloticus* from Marma Water Channels is presented in Table (1). Four classes of helminthes parasites comprising of cestodes, trematodes, nematodes and Acanthocephalans were identified.

Cestodes were found to be the most encountered parasites in the fishes with a total number of 10 fishes being infected. A total of 12 parasites of *B. achelognathii* and *B. infrequens* were recovered. Nematode are next to the cestodes in occurrence with a total no. 6 fishes being infected. A total no of 6 parasites of *Rhabdoconacongolansis* were recovered.

Trematode were next in occurrence after nematodes in which 2 fishes were found to be infected by only 1 cercaria of heterophiid parasites. Acanthocephalans were least encountered with only 1 fish species being infected. A total of 3 cystacanth cleared stage were recovered.

Table 1: Prevalence of Helminths Parasite in *H. niloticus* in Marma water channels, Kirikasamma (N = 85)

Class and specie of Parasite	No of Fish infected (%)	No of Parasite recovered (%)
CESTODA		
Bothriocephalusacheilognathii	8(42.1)	9(40.9)
Biacetabuluminfrequens	2(10.5)	3(13.6)
TREMATODA		
Cecaria of *heterophiid*	2(10.5)	1(4.5)
NEMATODA		
Rhabdochonacongolensis	6(31.6)	6(27.3)
ACANTHOCEPHALA		
Cystacath (larval stage)	1(5.3)	3(13.6)
Total infected	19(22.4)	
No. Un-infected	66(77.6)	
Grand Total	85(100)	22(100)

Helminths Infection in relation to sex.

Result for the helminthes infection in relation to sex, in *H. Niloticus*a represented in Table (2). A total of 85 fishes were examined and 49 were found to be males with 11 being infected, while 36 were females with 8 being infected with helminthes parasites. The prevalence observed between size in relation to intestinal helminthes was not significant (χ^2= 1.341, d.f = 2(0.511)).

Table 2: Prevalence of Helminths infection in *H.niloticus* in relation to Sex

Sex of fish	*H.niloticus*	
	No examined	No infected (%)
Male	49	11 (24.4)
Female	36	8 (22.2)
Total	85	19 (22.4)

χ^2 = 0.001, d.f = 1(0.980)

Prevalence of Helminths Infection in relation to Length and Weight

The results of helminthes infection in *H. niloticus* were in Table (3). *H. niloticus* with the standard length of 35 above (cm) had the highest prevalence (33.5%) while those that range from 15 – 24.9cm had the least prevalence (9.1%). There was no significant difference between size and prevalence rate {χ^2 = 2.811, d.f = 2(0.245)}.

Table 3: Prevalence of Helminth infection in *H. niloticus* in relation to Length

	H. nilotiscus	
Range (cm)	No examined	No infected (%)
15 - 24.9	11	1 (9.1)
25 - 34.9	57	12 (21.1)
35 – above	17	6 (35.3)
Total	85	19 (22.4)

χ^2 = 2.811, d.f = 2(0.245)

The results of helminthes infection in *H. niloticus* were in Table (4). *H. niloticus* that weight 500g and above had higher prevalence of 4(50%), whereas those that weight 100 – 199g and 300-399 had the least prevalence of 2(7.47) and 1(6.3%) respectively. Prevalence rate in relation to weight was not statistically different (χ^2 = 14.194, d.f = 5(0.014)).

Table 4: Prevalence of Helminths infection in *H. niloticus* in relation to Weight

	H.niloticus	
Range (g)	No examined	No infected (%)
1 – 99	3	1 (33.3)
100 – 199	27	2 (7.4)
200 – 299	25	10 (40)
300 – 399	16	1 (6.3)
400 – 499	6	1 (16.7)
500 – above	8	4 (50)
Total	85	19 (22.4)

χ^2 = 14.194, d.f = 5(0.014)

Discussion

A total number of 85 fishes was examined and 19 was found to be infested with parasites and where observed to harbor a total 22 parasites. This number is lower when compared to Solomon *et al.,* (2016)who work on 100 specimens each of *Bagrusfilamentosus* and *C. citharus* and recovered 198 parasites in River Benue, Makurdi, he stated that carnivorous/omnivorous fish species harbor more heterogeneous communities of parasites than herbivorous species do. In this study the overall prevalence was (22.4)this is slightly higher to compared with the previous study by Oniye *et al*.,(2004) who reported (11.96%) in their study Helminth Parasites of *Clarias* catfish.

The result of the parasitic species isolated shows four classes of intestinal helmiths recovered namely cestode 12(54.9%), trematode 1(4.5%), nematode 6(27.3%) and Acanthocephala

3(13.6%). Cestodes had the highest occurrence, followed bynematodes, Acanthocephala and then trematodes. This finding is not consonance with earlier reported work of (Abdel-Gaber *et al*, 2015) who held that nematodes had the highest occurrence, while cestodes parasites showed maximum prevalence in the intestine. In addition, Eyo and Iyaji (2014) observed that the high infection of *C. gariepinus* by cestode parasites could be due to the injection of eggs, copepods and molluscs which serve as intermediate hosts of the larval stages of the cestodes. The recovery of cestodes, trematode, nematodes and Acanthocephalain this study could have serious physiological consequences as they could interfere with the absorption of food nutrients in the fish intestine. This observation agrees with the report of Biu *et al*, (2014) who stated that such interference could reduce food intake.

Out of the 19 specimens infected 11(24.4%) were males and8(22.2%) were females which show that males were heavily infected more than the females (See table 2).Solomon *et al*., (2016) reported high infestation in female (60.87%) than the male (37.04%) in *Bagrusfilamentosus* studied. There was a significant relationship between host sex and prevalence of parasites with the females being more infected (Guidelli *et al*. 2003).Several researchers have argued that due to the cost of sexual selection males are more heavily infected with parasite than females (Kurshid and Ahmad, 2013; Esiest, 2013; Dan-kishiya *et al*. 2013 and Omeji, 2014). It was further explained that due to competition formates, males may be operating closer to their physiological limits than females (Omeji *et al*, 2013; Eyo and Iyaji 2014), hence resulting in higher levels of stress and reduced immune competence in males relative to females (Herbert and Cohen 1993). Sex biased parasitism can result from differences in immune competence with males predicted to bear a greater cost of sexual selection and immune suppressive effects of testosterone production (Kurshid and Ahmad, 2013; Esiest, 2013; Dan-kishiya *et al*. 2013) and thus to become more susceptible to parasitic infection than females.

It was observed in this study that the prevalence of infection in *H. niloticus* increased with increasing size. Similar observations were reported by Ayanda (2009) and Olurinand Samorin (2006), that the longer and heavier the fish, the greater the susceptibility to parasitic infection. This observation could be attributed to the fact that bigger fish provides larger surface area for infection to multiply in numbers than in smaller ones, and also as a result of changes in diet from Phytoplankton and Zooplankton to insects, larvae, snails, worms and crustaceans for food as smaller fishes grow into bigger ones (Obano *et al.,* 2010) . The higher number of parasites and intensities recorded in bigger fish with the weight classes of 500g-above could be attributed to their quest for survival (Ayanda, 2009). Bichi and Dawaki, (2000) stated that increase in the abundance of parasites is associated with host size.

Conclusion

Based on the result obtained it can be concluded that the parasite prevalence in *H. niloticus* studied from Marma Water Channel is (22.4%). Prevalence of infection was higher in males (24.4%) *H. niloticus,* than in females(22.2). *H. niloticus*with higher standard length and weight had higher prevalence of (35.3%) and (50%) respectively.

The following recommendations are made:

i. Based on the outcome of this work it is recommended that, there should be an enlightenment on the health implication of these parasite found in the water channel, which is harmful to both humans and the fishes.

ii. Prevention of water contamination both by raising public awareness of the dangers of defecating in recreational bodies of water and by implementation of basic sanitation measures;
iii. Screening and successful treatment of people infected with the parasite; and prevention of infection of humans via consumption of raw, infected fish. Also education about proper preparation of fish is a proper preventive measure.

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