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Level of infection of Intestinal capillariasis in *Clarias gariepinus* (Burchell, 1822) (Clariidae) in Sokoto, Nigeria

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Abstract

Study was conducted on intestinal capillariasis caused by nematode (*Capillaria philippinensis)* in catfish (*Clarias gariepinus)* in River Rima Kwalkwalawa, Sokoto, a riverine area, where most of the human population is poor and they eat the fish from this river. A total of eighty specimens of *Clarias gariepinus* were examined. A high prevalence of 50% was observed in the studied samples. The prevalence of infection was high in females fish with 60% followed by the male fish with 44% rate of infection. The prevalence also vary according to size. The highest prevalence of 71.42 was observed among fish ranging from 16-20cm, and lowest by 32% in fish ranging from 21-25cm. On the basis of this study it can be concluded that intestinal capillariasis is endemic in the fish population of river Rima Kwalkwalawa, and prevention and control measures should be taken immediately, to avoid infection to human beings and spread of disease.

Keywords: Helminth parasites, *Clarias gariepinus,* intestinal capillariasis, fish gut parasite, food born diseases.

Introduction

Clarias gariepinus (Burchell 1822) family clariidae is generally considered to be one of the most important tropical catfish species for aquaculture in West Africa, since the fish has high growth rate, resistant to handling and stress, do not require much care, and at high in demand in African countries (Akinsanya and Otubanjo 2005). The fish is generally classified as omnivores or predators, feeding on aquatic insects, other smaller fish and plants debris (Micha 1973). The major hinderance in fish production are helminth parasites (Akinsanya and Otubanjo 2005); Yakubu et al. (2002). These

parasites are pathogenic in the alimentary canal; where they can cause irritation of gastric mucosa (William 1969); degenerative changes in the gut wall (Banhawy et al. 1975); and mechanical damage caused by attachment organs. This reduces growth and weight gain of fish. The intestinal parasites not only reduce quantity and quality of fish production, but also transmit diseases.

Capillariasis is caused by the nematode *Capillaria philippinensis*. Infection causes severe diarrhea and protein loss resulting in dehydration, cachexia, and eventually death. Infected patients may also have borborygmi, abdominal pain, weight loss, anorexia, vomiting, and bipedal edema (Cross et al. 2007). Fish-eating birds appear to be the natural final host, and freshwater or brackish-water fish are the intermediate hosts of capillariasis. Human infection occurs after ingestion of raw or improperly cooked fish. It is endemic in various parts of world (Cross et al. 1998; Arizono et. al. 2005; Austin et al. 1999; Ahmed et. al.1999; and Chichino et al. 1992).

Human health and aquatic animal health are organically related. Aquatic animals serve as important contributors to the nutritional protein, lipid, and vitamin requirements of humans and they are carriers and transmitters of many infectious and parasitic diseases to which humans are susceptible (Dawe 1990). In the present study we have aimed parasitic diseases of *C. gariepinus* the most commonly used fish by local population with the broader objective to contribute in human health issue.

Materials and methods

Sample collection

The samples were collected randomly from River Rima Kwalkwalawa of Sokoto state. The live fish were transported immediately to the parasitological laboratory of the Faculty of Science, Department of Biological Sciences, Zoology unit, for further investigation.

Length and weight measurement

Each sample was measured for body length and weight. The fish total length was measured in centimetre using metric ruler. The body weight was obtained in gram (gm) using weighting balance. The body measurement was recorded against each sample accordingly.

Examination of samples

Each sample fish was dissected ventrally using sharp scissors to observed parasite from the intestine. After dissecting the intestine, the intestine was placed in Petri dish containing normal saline solution (NaCl). Each Petri dish was then examined for parasite under microscope using x10 length and x40 objectives, parasites found were picked by forceps and placed in 10(%) formalin solutions for preservation.

Identification of sex

The sex of sample was determined based on the presence of genital papillae in mature male and female. The sex was confirmed after dissection by the presence of ovary in female and testis in male.

Identification of parasite

Identification of parasite was done using *systema helminthum* (Yamaguti 1958). The total samples of catfish (*C. gariepinus*) were subjected to parasitological laboratory for identification and confirmed by a senior paraasitologist.

The data collected was analyzed using percentage of infection (%) according to the sex variation, size variation and chi-square test for the level of infestation of parasites in intestine affected.

Percentage of infection= number of fish infected/ number of fish examined×100

Chi-square test= ε (observed-expected)^2/expected

Results

The result obtain during the research were presented in the tables below and nematode parasite was found to be infected the fish kwon as *Capillaria philippinensis* which causes *Intestinal capillariasis.*

TABLE 1: The prevalence of *Capillaria philippinensis* infection in relation to sex variation.

	MALE	FEMALE	COMBINED SEX
NUMBER OF FISH EXAMINED	50	30	80
NUMBER OF FISH INFECTED	22	18	40
PERECENTAGE OF INFECTION	44%	60%	50%

The table 1 shows that there is prevalence of infection between sex variations. Female is highly infected with sixty percent (60%) rate of infection followed by the male with forty percent (44%) rate of infection as showing in fig (1) below

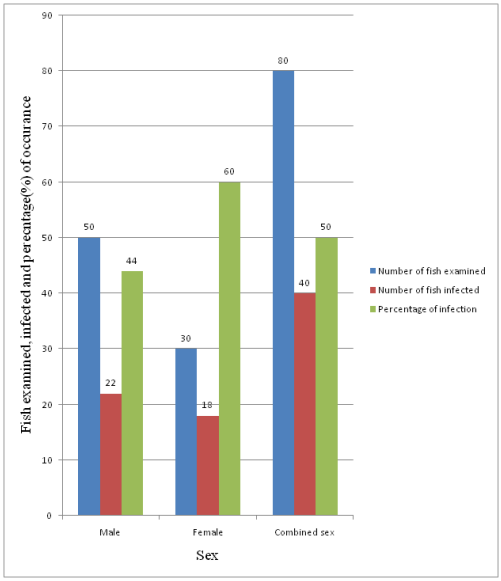

Fig 1: Prevalence of intestinal parasite infection in relation to sex variation.

TABLE 2: Using chi square to test the level of infestation of parasite in the intestine in relation to sex variation X^2= (Observed-Expected)^2/Expected

SEX	OBSER.	EXP.	OB-EX	(OB-EX)^2	(OB-EX)^2/EX
MALE	22	25	-3	9	0.36
FEMALE	18	15	3	9	0.6
TOTAL	40	40	0	18	0.36

X^2= 0.36
Degree of freedom= n-1 =2-1=1
Where N stand for number of parameter
Degree of freedom is 1 at 5 % is 3.841 tabulated

INFERENCE
Since tabulated value (3.841) is greater than calculated value (0.36) then we accept the null hypothesis that is there is no variation in the prevalence of intestinal parasite infection between the sexes at 5 percent (%) level of significance.

TABLE 3: The prevalence of *Capillaria philippinensis* infection in relation to size variation.

	BODY LENGTH(T.L)				
PARAMETERS	10-15cm	16-20cm	21-25cm	26-30cm	Total
Number of fish examined	-	14	50	16	80
Number of fish infected	-	10	16	10	36
Percentage of infection (%)		71.42%	32%	62.5%	32.5%

The table 3 shows that there is prevalence of infection between size variations. Those ranges between 16-20cm are highly infected with 71.42% followed by 26-30cm with 62.50% and 21-25cm with 32% using percentage of infection as showing in Fig (2) below.

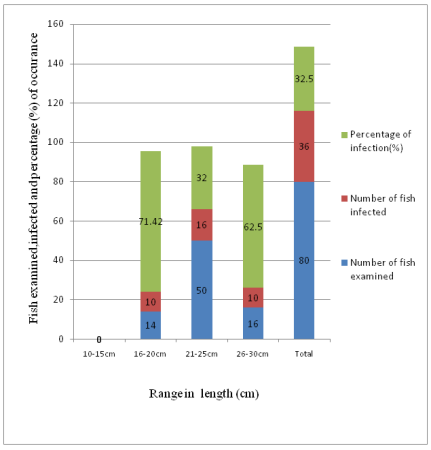

Fig 2: Prevalence of intestinal parasite infection in relation to size variation

TABLE 4: Using chi square to test the level of infestation of parasite in the intestine in relation to size variation X^2= (Observed-Expected)^2/Expected

LENGTH	OBSER.	EXP.	OB-EX	$(OB-EX)^2$	$(OB-EX)^2/E$
16-20cm	10	6.3	3.7	13.69	2.173
21-25cm	16	22.5	-6.5	42.25	1.877
26-30cm	10	7.2	2.8	7.84	1.088
Total	36	36	0	63.78	5.138

X^2= 5.138
Degree of freedom= n-1 =3-1=2
Where N stand for number of parameter
Degree of freedom is 2 at 5 % is 5.991 tabulated

INFERENCE
Since tabulated value (5.991) is greater than calculated value (5.138) then we accept the null hypothesis that is there is no variation in the prevalence of intestinal parasite infection in relation to size variation at 5 percent (%) level of significance

DISCUSSION
It is clear from results that fish population of study area (River Rima, Sokoto) has a high prevalence (50%) of intestinal capillariasis. The results in table 1 shows significance variation between sexes using percentage of infection; females are highly infected with 60% followed by males with 44% rate of infection (Fig.1). This may be due to the fact that females are active feeder, because they need more protein and energy compared to their male counterparts in order to fulfil demand of their egg laying and ovarian development. However, table 2, shows that there is no significance variation between sexes using chi square test at 5 percent (%) level of significance, since the tabulated value is greater than the calculated. While table 3 shows that there is significance variation between size variation using percentage of infection. Those range between 16-20cm are highly infected with 71.42% followed by 26-30cm with 62.50% and lastly, those range between 21-25cm with 32% using percentage of infection (Fig.2), while table 4 shows that there is no significance variation between size variation using chi square test at 5 percent (%) level of significance since the tabulated value is greater than the calculated.

The above variations in infection rate among sex and size can be as a result of changes in physico-chemical parameters or variation in food habits; diet; and natural immunity of the individual fish. Lifespan, mobility of the host throughout its life including the variety of habitats it encounters, its population density and the size attained are also the factors that can affect degree of parasitic infestation. Larger hosts can provide more habitats suitable for parasites than the smaller ones.

Man acquire the disease (human intestinal capillariasis) after eating raw or improperly cooked fish, even a single table bite of infected fish is enough to cause disease (Saichua et al., 2008). The disease causes intermittent or continuous diarrhea

leading to weight loss, abdominal pain, borborygmi, muscle wasting, weakness and edema. If the intestinal capillariasis patients are not treated they will have severe muscle wasting, cachexia, edema and death. Most patients died from electrolyte loss resulting in heart failure and/or septicemia (Cross 1992).

Fish eating birds are susceptible and can transmit disease (Bhaibulaya et al. 1979). Therefore, fish eating birds can be a natural reservoir host that upon defecation *C. philippinensis* eggs are released to water bodies where the parasite infect other hosts, these mechanism maintain parasite life cycle in nature (Saichua et al. 2008).

It is important to mention here that most of the population in study area (Kwalkwalawa) is poor and they rely on fish from the same river for their food and nutritive and/or earning demands. In this environment they don't practice pressure cooker/microwave for cooking that can kill parasite during cooking, but the population use open pots for cooking, mostly they use firewood which may not enough for cooking the food properly. In the view of this study, it can be said that, it is not only dangerous to eat fishes from the studied river but can create other serious health problems to the people of state and country.

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