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PREVALENCE OF PARASITES OF CULTURED CATFISH (*Clarias gariepinus*) IN SOUTHEASTERN NIGERIA

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ABSTRACT

The prevalence of parasites in catfish (Clarias gariepinus) in southeastern Nigeria was studied using 90 randomly selected fishes from both concrete (50 fish) and earthen (40 fish) ponds in the region. The study was conducted between February and April, 2015. The fish were purchased live from the selected fish ponds and their length, weight and sex determined before being humanely sacrificed. Skin scrapings were obtained and examined for ectoparasites while the gills and the gastrointestinal tracts were dissected out and examined for presence of endoparasites. Available parasites were isolated and identified using standard parasitological procedures. Two parasites were identified, namely, the nematode Procamallanus species which occurred in 62 (89%) and Acanthcephala species in 7 (10.1%) of the fishes examined. The results showed an overall prevalence of 22.2% representing 4.4%, 0%, 17.8%, and 0% for Enugu, Ebonyi, Imo and Anambra States respectively. Sex, length, weight and pond type significantly ($p<0.05$) influenced the prevalence of parasites of Clarias gariepinus in the study. It was concluded from that the prevalence of parasites of cultured Clarias gariepinus in southeastern Nigeria is 22.2% and that sex, length, weight of fish and pond type significantly influenced the prevalence.

Keywords: Prevalence; Parasites; *Clarias gariepinus*; Southeastern Nigeria.

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INTRODUCTION

Fish farming is of major economic importance to many individuals and communities in southeastern Nigeria as fish remains the most easily affordable source of animal protein to the average Nigerian family. FAO [1] reports that more than 40% of the protein diet of two-thirds of the world population comes from fish. Catfishes are popular, highly priced and requested for by consumers and fish farmers [2], especially in southeastern Nigeria. Over the years, fish culture has become intensified extensively to boost production and this is fraught with several health and management challenges mainly diseases resulting from nutritional deficiencies and parasitic infections. All over the world, especially in the tropics, parasites are of major concern to both freshwater and marine fishes [3]. Fish parasites are believed to be most important under artificial culture system as the fishes are affected by artificial

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conditions and numerous stress factors which may affect their immunity when compared to those under natural environment [4].

Fish parasites are of great importance since they are capable of causing reduced growth and productivity, increased susceptibility to other diseases, varying degrees of mechanical injuries and mortality [5]. More so, the ability of fish especially freshwater fish to transmit parasites to humans and animals has long been established [6]. Some parasites of fish are zoonotic while they are also capable of serving as paratenic/intermediate or definitive hosts of parasites that may be harmful to man and other animals [7]. Reports abound on the prevalence of parasites of fishes under the natural environments like rivers, streams and lakes [2,3,5,7,8,9,10]. However, paucity of information exists on the occurrence and prevalence of parasites of cultured catfishes in southeastern Nigeria despite the premium placed on them. The prevalence of parasitic infection in fish varies considerably from one geographical region to another and amongst fish farms thus, necessitating periodic surveillance on the prevalence of parasitic infections in aquaculture within a given locality for successful formulation and implementation of an effective parasite control strategy. This study was therefore designed to determine the prevalence of parasitic infections of catfishes (*Clarias gariepinus)* cultured in southeastern Nigeria.

MATERIALS AND METHODS

Study Area and Population

The study was carried out in Southeastern Nigeria which comprises of Enugu, Abia, Imo, Ebonyi and Anambra States of Nigeria. The zone is situated in the lowland forest region of Nigeria located between latitude 5 - 7^0 N and longitude 6 - 8^0E. It shares border with Benue and Kogi States to the north, Edo and Delta States to the west, Rivers and Akwa Ibom States to the south and Cross River state to the east. Southeastern Nigeria is generally characterized by the Igbo culture and language. The study population comprised of catfishes cultured in both concrete and earthen ponds in Southeastern Nigeria.

Study Design and Sampling Technique

Four states namely Anambra, Enugu, Imo and Ebonyi states were randomly chosen from the five Southeastern states of Nigeria. Six fish farms were purposively chosen from the four afore-selected states based on the pond type and the farmers' willingness to allow access to their ponds and sell their fishes at the time of the study. This study was conducted between February and April, 2015. Ninety mature *Clarias gariepinus* fishes were randomly selected from both concrete farms (n = 50) located in Enugu (Nsukka and Enugu metropolis) and Imo (Owerri metropolis) States, and earthen ponds (n = 40) located in Anambra (Agulu and Ihiala) and Ebonyi (Abakaliki) States. The fishes were collected by the use of drag nets after the water level was reduced by draining a portion of the water in the pond. The fishes were thereafter transferred into a plastic container with water and transported to the Department of Veterinary Parasitology Research Laboratory of the University of Nigeria for further examination.

Examination of the samples

Prior to examination, the fishes were stunned by breaking their spine at the area just below the head. The length of each fish was measured with a thread beginning from the tip of the snout to the tip of the caudal fin and read in centimeters with a meter rule. The weight of the fishes was also measured using top loading sensitive weighing balance. The sex of the fishes were determined by examination of the genitalia under the lower abdominal region and confirmed by the presence of ovarian tissues/testes following dissection [11].

The entire skin surface of each of the fishes was scraped into a Petri dish and examined for ectoparasites with the aid of a stereomicroscope. Each of the fishes was eviscerated with the alimentary canal dissected out. The alimentary canal was separated into the various sections; esophagus, stomach, small intestine and large intestine. Each section was placed in a separate Petri dish containing distilled water and examined for parasite recovery. The gills of each fish were also dissected out, cut into small pieces and placed in

appropriately labeled Petri dishes for examination and parasite recovery. The parasites recovered were identified morphologically by comparing their microscopic features with the pictorial fish parasites' guide of Pounder *et al*. [12].

Data Analysis

Data obtained from this study were analyzed descriptively and the results presented in percentages. The Chi-square (x^2) test was used to assess differences in the prevalence of infection between the sexes, weight, type of pond (concrete and earthen) and length of fish. Probabilities of $P<0.05$ were considered significant.

RESULTS

Out of the 90 fishes examined for gastrointestinal helminths, 20 had helminth parasites; giving an overall prevalence of 22.2%. Among the States studied, prevalence of helminth infection were 0%, 0%, 4.4% and 17.8% for Anambra, Ebonyi, Enugu and Imo States (Table 1). Out of the 50 fishes sampled from concrete ponds in the study area, 20 (40%) were positive for parasites while no parasites 0 (0%) were recovered in the 40 fish samples from earthen ponds in the study area. When the fish parasite prevalence was analyzed by pond type using the Chi-square (x^2) test, concrete ponds had significantly ($P < 0.05$) higher prevalence than earthen ponds (Table 1).

On the basis of sex, 60 (66.7%) of the recovered fish were males while 30 (33.3%) were females and the prevalence of infection was 17 (28.33%) for male fish and 3 (10%) for female fish. A Chi-square (x^2) analysis indicated that the prevalence of helminth parasitism was significantly ($P < 0.05$) higher in males than females (Table 1).

The mean length and weight of parasitized fish populations were significantly ($P < 0.05$) higher than those of non-parasitized fish. *Procamallanus spp.* and *Acanthocephalan spp.* were the only parasite species recovered during the study. The nematode, *Procamallanus spp.* was more prevalent (89.9%) and occurred in the stomach and large intestine of the fish while the *Acanthocephalan spp*. were recovered in 10.1% of the fish and occurred only in the small intestine (Table 3).

Table 1: Prevalence of parasites according to location of pond, pond type and sex of fish in southeastern Nigeria

		Number examined	Number (%) infected
Overall		90	20 (22.2)
Location			
Enugu State	Nsukka	20	2 (2.2)
	Enugu	10	2 (2.2)
Imo State	Owerri	20	16 (17.8)
Ebonyi State	Abakaliki	19	0 (0)
Anambra State	Agulu/Ihiala	21	0 (0)
Pond type	Concrete	50	20 (40.0)
	Earthen	40	0 ()
Sex of fish	Male	60	17 (28.3)
	Female	30	3 (10.0)

Table 2: Mean length and weight of parasitized and non parasitized catfish (*Clarias gariepinus* from artificial ponds in southeastern Nigeria.

Parasite	Parasitized	Non parasitized
Mean length (cm)	61.1 ± 19.2	35.5 ± 5.4
Mean weight |(kg)	1623.0 ± 308.9	689.4 ± 104.3

Table 3: Distribution of parasites recovered from infected fish examined in southeastern Nigeria.

Parasite	Number (%) Infected	Predilection site
Procamallanus species	62 (89.9)	Stomach/Large intestine
Acanthocephala species	7 (10.1)	Small intestine

DISCUSSION

This study on the prevalence of parasites of cultured catfish (*Clarias gariepinus*) in southeastern Nigeria indicated an overall prevalence of 22.2%. This finding is however, low compared to the 72.01% reported by Omeji *et al*. [13] in earthen and concrete pond populations of *Clarias gariepinus* in Benue state in northcentral Nigeria; 77.7% by Adeyemo and Falaye [14] in Ibadan, southwestern Nigeria and 30.9% by Bichi and Dawaki [15] in Kano, northwestern Nigeria. Similarly, prevalence rates of 27.5%, 32.6% and 76.04% were reported in wild population of *Clarias gariepinus* in northcentral and southwestern Nigeria and in Ethiopia [9, 16, 17]. These differences in prevalence may be attributed to the parasite species and their biology, fish feeding habits, physical factors and hygiene of the water body, availability of intermediate hosts and management practices.

The prevalence of infection as revealed in this study was significantly ($P<0.05$) higher in the concrete (22.2%) than earthen ponds (0%). This finding disagrees with that of Ndegela *et al*. [18] who reported prevalence of 23% and 2% for earthen and concrete ponds respectively. Also, the report of prevalence rates of 77.42% and 66.67% for earthen and concrete pond by Omeji *et al*. [13] disagrees with the findings of this study. Mdelgela *et al*. [18] attributed the higher prevalence of infection in earthen ponds to the use of surface water and excessive silting which provided favorable environment for benthic micro-invertebrates to develop and thus predisposed the fish to parasitic infections. However, the zero prevalence of infection recorded in earthen ponds during this study could be attributed to the excessive use of anthelmintics and/or drug preparations containing anthelmintics by the fish farmers. This practice may result to anthelmintic resistance in fish in the near future. Also, fishes in the earthen ponds in this study could be said to be under less stress as stress is major factor that encourages susceptibility to infection and consequently disease [19].

This study also showed that *Procamallanus spp.* and *Acanthocephala spp.* were the parasite species present with the former being the most prevalent. *Procamallanus spp*. is a widely occurring parasite of clariid catfish in Nigeria and in Africa at large, having been recorded in addition to other parasites in Niger Delta region by[20], northwestern Nigeria by [2], northcentral Nigeria by [13] and in Ethiopia by [17]. *Procamallanus spp.* possess digestive tract unlike *Acanthocephala spp.* which explains the flexibility observed in the choice of stomach and large intestine as their predilection site. *Procamallanus spp.* and *Acanthocephala spp*. in small numbers may cause little or no harm to fishes. However, the parasites in large numbers are known to cause anaemia, lethargy, ulcerative lesions, erratic behavior, shedding of skin and death [21] resulting in loss of productivity.

Sex was shown to significantly (p<0.05) affect the prevalence of parasites of *Clarias gariepinus* in the study area as more males (18.9%) were infected than females (3.3%) though twice the number of female fishes compared to the males were sampled. This agrees with the reports of [2, 22] and was attributed to the differential feeding by both sexes as male fish are believed to explore available food resources that might have been parasitized than their female counterparts. Other studies [9,13,23] reported higher parasitic prevalence in female *Clarias gariepinus* which they attributed to the physiological state of the females. Hassan *et al.* [10] reported an insignificant difference in the infection rates between male and female *Clarias gariepinus.* However, inconsistent explanations abound in the literature as regards the relationship between sex and parasitic prevalence in fish, with some indicating strong association while others showing the antipode [24].

Fish length and weight were also found to significantly affect parasitic prevalence in this study as high weighing and elongated fish (big sized fish) recorded increased parasitic prevalence when compared to those with average or low weight and length (small sized fish). This could be attributed to the fact that high weighing and long fish (big-sized fishes) consumes great variety of food, covers wider area in search of food and also exhibits great variety of feeding styles. These findings are consistent with those of [2, 9, 11, 13], but differs with that of [25] who reported high prevalence in small sized fishes attributing it to low levels of immunity.

In conclusion, this study reveals that parasitic infection is not very common in cultured *Claria gariepinus* in the southeastern Nigeria. *Procamallanus spp.* and *Acanthocephala spp.* are the major fish parasites in the study area with the former being the most prevalent parasite. Sex, pond type, length and weight were found to influence the prevalence of parasites of *Clarias gariepinus* in southeastern Nigeria.

Competing interests

The authors declare they have no competing interests.

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