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INCIDENCE OF GASTROINTESTINAL PARASITES OF CATFISH (*Clarias gariepinus*) FROM RIVER NASARAWA, NIGERIA

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ABSTRACT

Parasites attack fish causing destruction of skin and gill epithelium and injury to tissues or organs in the process of burrowing or consuming food. The gastrointestinal parasites of *Clarias gariepinu* (Catfish) from River Nasarawa were investigated in this study. Two hundred (200) samples of *Clarias gariepinus* of different sizes and sexes were obtained fresh and brought to Zoology laboratory, Nasarawa State University, Keffi for intestinal parasites examination. The fish were dissected through the abdomen by making a longitudinal slit on the ventral surface from the point of pectoral fins to the anus using a blade. The gastrointestinal tract was sectioned into oesophagus, stomach and intestine. The contents of various parts of the gastrointestinal tract were examined for parasites using floatation and sedimentation methods. Sixty (60) out of 200, that is 30% fish samples examined were found to be infected with parasites. A total of 74 parasites were isolated from different parts of gastrointestinal tract belonging to five (5) species. 3(3.33%) parasites of *Proamallanus spp* were isolated from oesophagus, 45(60.00%) parasites of *Hexamita spp*, 10(13.33%) parasites of *Protoopalina spp* and 12(18.34%) parasites of *Microsporidian spp* were isolated from stomach while 4(5.00%) parasites of *D. latum* were isolated from the intestine. Parasitic infection presents a potential threat to the health of fish and as a result of this, an understanding of the intestinal parasites of fish in the wild is important in order to find ways of avoiding mortality and disease.

Keywords: Gastrointestinal, Parasites, Catfish, River Nasarawa

INTRODUCTION

Fish is a rich source of animal protein that contains lipid, mineral oil, and vitamins which have remarkable impact on the lives of many individuals and communities, that is relatively cheap and affordable (Ashade *et al.,* 2013). Generally, there has been tremendous increase in the development of fish farming and culture attributable to the increased need for affordable animal protein especially in the tropics (Ogbu *et al.,* 2019). These fish not only provides food for immediate consumption but people rely on fishing for economic gains and job creation. Nigeria is among the largest fish consumers in the world with over 1.5million tonnes of fish consumed annually (Imam *et al*., 2010).

In Nigeria, the consumption and demand for fish protein is increasing due to its affordability and relatively high nutrient contents (Omoniyi and Ojelade 2017). However, fish production has been reportedly low and unable to meet the demand of the ever-increasing human population due to many factors among which is fish disease caused by parasites (Olofintoye, 2006). Disease is an important factor militating against fish production. Parasitic infection and diseases are some of the factors hindering high productivity in fish farming (Kayis *et al*., 2009). 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 (Bichi and Yelwa, 2010). Parasites are the most diverse and common pathogens the aquaculturist encounter and can either be external or internal. Parasitic infections often give an indication of the quality of water, since parasites generally increase in abundance and diversity in more polluted waters (Avenant-Oldewage, 2002). Fish parasites result in economic losses not only mortality, but also from treatment expenses, growth reduction during and after outbreak of disease and this militates against expansion of aquaculture (Omeji, 2011).

These parasites attack the fish, causing massive destruction of skin and gill epithelium and injury to the tissues or organs in the process of burrowing or consuming food, diverting part of its nutrient supply and allowing secondary infections to develop or the removal of digested food in the gut of the fish as well as the secretion of proteolysis enzymes (Omeji *et al*., 2011). The majority of the fish parasites which causes diseases in fish include protozoan parasites. Typically, these parasites are present in large numbers either on the surface of the fish, within the gills, or both. When they are present in the gills, they cause problems with respiration, and death will commonly occur when additional stressors are present in the aquatic environment (Solomon *et al.,* 2012). The health of fishes is affected by parasites which makes them susceptible to secondary infection by disease causing organisms (e.g. bacteria, fungi and viruses). Apart from this, parasites compete for food thereby depriving the fish of essential nutrients and inhibiting the growth which could lead to morbidity and mostly with consequent economic loss (Khalil and Polling, 1997). Parasites also inflicts damage on the host, most times causing mortalities, which leads to losses in commercial fisheries and aquaculture (Roberts, 2001.

Losses resulting from these parasites are at high densities under existing conditions and, if left uncontrolled, may lead to catastrophic proportions (Abbas *et al.,* 2014). The normal growth of fish is affected by parasites that lives on the fish if highly infested. Parasites not only effect the survival of fish directly by reduced condition (fish size), changing the behaviour, further susceptible to infection, but also lowered swimming ability, decrease their growth rate and increase mortalities (Piasecki, 2004). It has also reported that fish culture could provide a large reservoir of parasitic pathogens common to both wild and cultured fishes (Bichi and lbrahim, 2009), but up till the present time, no epidemic of fish parasites has been reported in Nigeria. However, the Nigerian freshwater bodies need to be assessed and monitored for

parasitic infections as culture of fishes is becoming more intensive and widespread and the consumption of these parasites could pose a serious health challenge to the consumers. With the current economic hardship, fish farming is faced with serious setback following fluctuating financial constraints and increasing novel of diseases that havoc the productivity and yield in fish market. This study therefore, is set to fill-in the gap of knowledge in identifying these disease species that threatened the economic value of fish from River Nasarawa in Nasarawa Local Government Area.

MATERIALS AND METHODS

Sample Collection

A total number of Two Hundred (200) samples of *Clarias gariepinus* of different weight, length and sexes were purchased fresh from local fishermen at the landing site of the River Nasarawa, Nasarawa Local Government Area, Nigeria. The fish samples were transported in large plastic containers filled with water of same source to the Laboratory of Department of Zoology, Nasarawa State University Keffi for the analysis.

Sex Determination

The sexes of the fish were determined by examination of the papillae. It is long in male while in the female it is round and reddish as described by Lagrue *et al.* (2011). In addition, the presence of testes in males and ovaries in females confirm their identity (Imam *et al.,*2010).

Length Measurement

The total length of each fish sample were determined after placing the fish laterally on the
dissecting board, using meter rule to measure from the snout to the end of the tail, while
the standard length was from the snout to the end of the caudal peduncle (Omotayo *et al.,* 2019)

Weight Measurement

Weight of each of the fish was determined using electronic weighing balance and measured to the nearest 0.1g (Omotayo, *et al.,* 2019).

Dissection and Parasite Examination of Fish Samples

This was done according to Salawu *et al,* (2013). The fish were immobilized by cervical dislocation for easy handling prior to dissection on a dissecting board. The fish were dissected through the abdomen by making a longitudinal slit on the ventral surface from a point level of the pectoral fins to the anus using a blade. The gastrointestinal tract of each fish was removed and sectioned into oesophagus, stomach and intestine. Sections were placed into three separate Petri dishes. Each section was slit longitudinal and washed with normal saline. The content of the various parts of the gastrointestinal tract was examined using floatation and sedimentation techniques (Kawe *et al.,* 2016).

Identification of Parasite

The parasites recovered were identified morphologically by comparing their microscopic features with keys to common fresh water fish parasites pictorial guide by Deborah *et al,*
(2005).

Determination of Parasitic Prevalence

The percentage prevalence of parasites was determined using the formula:

$$\frac{\text{Number of fish infected}}{\text{Number of fish examined}} \times 100$$

Statistical Analysis

Descriptive statistical analyses were used to analyse the data obtained and prevalence of the parasitic infection were expressed in percentage. Data analysed were presented in tabular form

RESULT AND DISCUSSION

Results

A total of two hundred (200) fish (*Clarias gariepinus*) samples were examined for gastrointestinal parasites. Out of which 60 (30.00%) fish samples were found to be infected with parasites (Table 1). A total of 26 (26.26%) male was found to be infected while 34 (33.66%) females were found infected. The major parasitic groups encountered were from Protozoa 67(91.67%), Nematodes 3(3.33%) and Cestodes 4(5.00%) taxonomic group. Protozoan species found were *Hexamita spp* 45 (60.00%), *Protoopalina spp* 10 (13.33%) and *Microsporidian* spp 12 (18.34%), Nematodes was represented by *Procamallanus spp* 3(3.33%) while Cestodes; *Diphyllobothrium latum* 4 (5.00%) respectively.

The prevalence of gastrointestinal parasites of *Clarias gariepinus* in relation to location is presented on Table 2. The *Hexamita spp, Microsporidian spp* and *Protoopalina spp* were isolated from the stomach. *Diphyllobothrium latum* was found to inhabit the intestine and *Procamallanus spp* was isolated from oesophagus.

The prevalence of gastrointestinal parasites of *Clarias gariepinus* in relation to body weight is presented on Table 3. Out of the 35 (17.50%) fish that weighed less than 100g, 15 (42.85%) were found to be infected. Forty-seven (23.50%) fish weighed between 101-200g, 10 (21.28%) were found to be infected. 90 (45.00%) fish weighed between 201-300g, 30 (33.33%) were found to be infected. 20 (10.00%) fish weighed between 301-400g, 4 (20.00%) were found to be infected, while 8 (8.00%) fish that weighed greater than 400g, while 1 (12.50%) was found to be infected.

The prevalence of gastrointestinal parasites of *Clarias gariepinus* in relation to their standard length is presented on Table 4. Out of the 35 (17.50%) fish with standard length less than 10cm, 6(17.14%) were found to be infected. Forty (20.00%) fish with standard length between 11-20cm, 10(25.00%) were found to be infected. One hundred and Twenty-five fish (125) with standard length between 21-30cm were examined for the parasites and 44 (35.00%) were found to be infected. 125 (62.00%) fish with standard length between 21-30cm, 44 (35.00%) were found to be infected.

Table 1: Prevalence of Gastrointestinal Parasites of *Clarias gariepinus* in Relation to the sex

Sex	Number examined	Number infected	Prevalence (%)
Male	99	26	22.26
Female	101	34	33. 66
Total	200	60	30.00

Table 2: Prevalence of the Gastrointestinal Parasites in Relation to Location of Parasites

Taxonomic group	Parasite species	Location of parasite	Number of parasites recovered
Nematode	*Procamallanus spp*	Oesophagus	3
Protozoa	*Hexamita spp*	Stomach	45
Protozoa	*Protoopallina spp*	Stomach	10
Protozoa	*Microsporidian spp*	Stomach	12
Cestode	*D. latum*	Intestine	4
Total			74

Table 3: Prevalence of Gastrointestinal Parasites in Relation to Body Weight (g).

Weight (g)	Number examined	Number infected	Prevalence (%)
< 100	35	15	42.85
101 – 200	47	10	21.27
201 – 300	90	30	33.33
301 – 400	20	4	20.00
>401	8	1	12.5

Table 4: Prevalence of Gastrointestinal Parasites in Relation to Standard Length (cm).

Standard length (cm)	Number examined	Number infected	Prevalence (%)
< 10	35	6	17. 14
11 – 20	40	10	25.00
21 – 30	125	44	35.20

Discussion

This study shows a prevalence of 30% parasitic infection of *Clarias gariepinus* in River Nasarawa. The prevalence was relatively higher than the 22.33% recorded in lower and upper River Benue by Uruku *et al.* (2017), 16.67% recorded by Ekanem *et al.* (2011) from Great Kwa River, Calabar and 9. 82% recorded by Banyigyi *et al.* (2022) in Uke River, Nasarawa State. However, this value was lower when compared with the work of Banyigyi *et al.* (2020) who recorded 38.0% at Uke River in Nasarawa State and 48.63% in the study recorded at lower and upper Benue River by Omeji *et al.* (2014). These differences in prevalence could be due to the fact that these studies were conducted in different seasons and at different rivers where different human activities are carried out. Also, the rate of infection in these fish could be attributed to the sanitary condition of the place, the location of the river from residential area, population of people visiting the river to bath, laundering, swimming and other domestic activities.

The different parasites isolated from *Clarias gariepinus* are from Protozoa, Nematode and Cestode taxonomic group. Protozoan (*Hexamita spp, Protoopalina spp, Microsporidian*), Nematode (*Procamallanus spp*) and Cestode (*Diphyllobothrium latum*) were found and identified along the different locations. The number of protozoans isolated was higher than nematode and cestode. Nematodes are known to occur in body cavities or found penetrating subcutaneous tissue, this finding agrees with the research of Akinsanya *et al.* (2007).

The recovery of these parasites from different parts (oesophagus, stomach and intestine) in this study has also been recorded in other species by Omeji *et al.* (2014). However, it was observed in this study that the stomach had more parasites than other parts, which could

be attributed to the presence of ingested food. It could also be associated with the fact that this is where food is most abundant resulting in the release of parasite ova/cysts in food particles. There was no significant difference (P>0.05) in prevalence between male and female *Clarias gariepinus*. The 32-prevalence recorded on the female fish could be due to the physiological state of the females as most gravid females could have had reduced resistance to infestation by parasites. In addition, their increased rate of food intake to meet their food requirements for development of their eggs might have exposed them to more contact with the parasites which subsequently increased their chances of being infested. This observation agrees with Emere and Egbe (2006) and Omeji *et al.* (2015).

Comparing the prevalence of parasites in relation to weight, this study has higher rate of parasitic infection in bigger fish with weight of 201-300g. This is an indication that the weight of the fish is important in determining the parasite load and increased weight also increases fish susceptibility to parasitism. Similar finding was reported by Mohammed (1999) that prevalence was found to increase as the fish grow, and that could be attributed to the longer time of exposure to the environment by the body size. The difference in the parasite load could be attributed to the random selection of the specimen, this agrees with the findings of Olorin and Somorin (2006) and Akinsanya *et al*. (2008). Another observation was made by Ekanem *et al.* (2011) and Omeji *et al.* (2014) in relation to length classes for all species. The length classes within the range of 21 - 30cm recorded the highest prevalence of parasitic infection recovered compared to the small fishes, this finding confirms the work of (Bichi and Dawaki, 2000) who observed that the condition of infection was age factor while Ekanem *et al.* (2011) attributed it to the quantity of food intake by the animals. These investigations argued that the higher infection rates in adult than the young may be due to the longer duration of time the older fish were exposed to agent of infection in the environment.

CONCLUSION

Endoparasites especially the gastrointestinal parasites are among the important problems militating against fish production, because they have an indirect or sometimes direct effect on the productivity of fish from the wild. Parasitic infection also presents a potential threat to the health of fish and as a result of this, an understanding of endoparasites in the wild is essential in order to find ways of avoiding fish mortality and disease.

The effects of parasites on fish host in the wild may be difficult to isolate and quantify. However, studies of fish in captivity or under culture conditions have provided much information about the effects of parasites on the fish survival.

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