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Research Article

Prevalence of Gastrointestinal Parasites of African Catfish (*Clarias gariepinus)* from River Nasarawa, Nasarawa State, Nigeria

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ABSTRACT

Fish and fish products are significant sources of nutrients for humans. Parasites of fish are of concern since they often produce a weakening of the host's immunity thereby increasing susceptibility to secondary infections. This study was conducted with aimed to examine the prevalence of gastrointestinal parasites infecting fish. Field study was conducted during the period from September to November 2022. A total of 200 fish samples (*Clarias gariepinus*) were examined for the presence of gastrointestinal parasites. Result show that, total number of fishes infected 60(30.0%) out of which 26(26.26%) males and 34(33.66) female. Two helminths one each from Cestode and Nematode were isolated from the infected fishes. The Cestode and its prevalence were *Diphylobothrium latum* (5%) and nematode *Procamallanus* spp. (3.33%). The protozoa recovered included: *Hexamita* spp., *Protoopalina* spp. and Microsporidia with 60.00%, 23.33% and 18.34% respectively. The majority of the parasites were found in the intestine. Fish specimens that were lighter in weight 10 -200g had less infection (12.5%) but those found with parasites weighed between 201-400g (42%). There was no significant difference (P>0.05) in the infection between male and female Clarias gariepinus and with age on the prevalence and intensity of the gastrointestinal parasite. Wild fish (*Clarias gariepinus*) in River Nasarawa have a high prevalence of intestinal parasites, therefore it is recommended to avoid open defecation that finally is washed down to rivers and streams hence affecting the aquatic organisms and to properly cook wild fish obtained from River Nasarawa before consumption for safety.

Keywords: *Clarias gariepinus;* Gastrointestine; Nasarawa; Parasite; Public Health

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INTRODUCTION

Fish and fish products are very significant source of nutrients of animal origin for varying healthy nourishments which are affordable and within the reach of the ordinary inhabitants of most countries (FAO, 2017). It also provides a comparatively cheap source of animal protein for man and his livestock therefore; attention is now being focused on fish production, both from natural water and aquaculture (Ogbu *et al.,* 2019). African catfish (*Clarias gariepinus)* is generally classified as omnivores or predators feeding mainly on aquatic insects, fish and higher plants debris as reported for catfishes in the River Ubangui, Central African Republic (Ahmad, 2014). African catfish (*Clarias gariepinus)* is one of the economically important freshwater fish in river Nasarawa and it is found in all inland waters of Nigeria and recognized as an important fish food (Dan-Kishiya and Zakari, 2017). The wide geographical spread, high growth rate and the resistance to handling and stress has made *C. gariepinus* well valued in a wide number of African countries (Enas *et al*., 2013). In most part of the world, fish production is mainly from the wild. As the world population grows, fish resources are being depleted at an increasing rate as a result of environmental degradation, over harvesting, pollution thus fish production could no longer meet the demand of the growing population (God'spower *et al.,* 2016).

This had led to increase in the involvement of stakeholders in aquaculture and has also been plagued by the problems of overcrowding, poor environmental conditions and pollution which often result in reduced immunity of fish and higher susceptibility to parasites and diseases (Biu *et al*., 2014). Disease is an important factor militating against fish production and parasitic infection are some of the factors hindering high productivity in fish farming (Kayis *et al*., 2009). Parasitic diseases of fish are very common all over the world and are of particular importance in the tropics (Soliman and Nasr, 2015; God'spower *et al.,* 2016). Fish parasites are of great importance since they are capable of causing reduced growth and productivity, increased chance of susceptibility to other diseases (Bichi and Yelwa, 2010). Various parasites are associated with *C. gariepinus* in the wild and cultured environment where they cause morbidity, mortality and economic losses in aquaculture practice in various parts of the world (Biu *et al*., 2013). There is an increasing awareness of the importance of parasitic diseases as one of the major detrimental factors in fish farming (Keremah and Inko-Tariah, 2013; God'spower *et al.,* 2016). However, in Nasarawa Local Government Area of Nasarawa State, there is a paucity of information on the parasitic status of *C. gariepinus.* Therefore, this study sought to determine the prevalence of gastrointestinal helminth parasites in the study area with the view of quantifying the helminthic burden and to evaluate the relationship between infection, the sex, weight and length of *C. gariepinus*.

MATERIALS AND METHOD

Study Area

This study was carried out in Nasarawa Local Government Area, Nasarawa State, Nigeria. Nasarawa is located in North central region of Nigeria with a land area of 26,256 km² and lies between latitude 7° 45′ and 9° 25' N of the equator and between longitude 7° and 9° 37′ E of the Greenwich meridian with a population of 30,949. It is bounded to the North by Kaduna and Plateau States, to the South by Kogi State, East by Benue State and West by FCT Abuja. From its Central location its vegetation combines the savannah grassland (Nasarawa State Government, 2023).

Sample collection and Identification

A total of two hundred (200) samples of *Clarias gariepinus* of different weight, length and sexes were purchased alive from local fishermen at River Nasarawa. Total of 25 sampls were collected from two different sampling locations on weekly bases for the period of two months (September to October, 2022), and were transported live in a 25 litre plastic container containing water of same source to Zoology Laboratory, Nasarawa State University, Keffi, where they were sorted according to different sizes. Identification of the fishes was done based on external features as described by (Omeji *et al.,* 2013) Lengths and weights of the fishes were measured using a ruler calibrated in centimetre (cm) and digital weighing balance (Electronic Kitchen Scale, QE-KE-4), respectively using the method as describe by (CDC, 2013). The sexes of the fishes were identified by visual examination of the urinogenital system (papillae and as well presence of testes in males and ovaries in females) as described by Lagrue *et al.* (2011).

Examination for Parasite

The fishes were immobilized by cervical dislocation for easy handling prior to dissection on a dissecting board. The fishes were dissected through the abdomen by making a longitudinal slit on the ventral surface from the anus to a point level with the pectoral fins using a surgical blade. The alimentary tract was isolated stretched out and grouped into oesophagus, stomach and intestine. Sections were placed into three separate Petri dishes containing normal saline (0.6%). Each section was slit longitudinally and examined for parasites under a dissecting microscope at pox and 400x intensification. Parasites found were counted, fixed and preserved in 10% formalin (CDC, 2013).

Identification of parasites

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

Data Analysis

Statistical Package for the Social Science (SPSS) was used for the data analysis. The overall prevalence of the parasitic infection was expressed in percentage. Data were also presented in tabulated and chart forms. Chi square was used to compute and arrived at statistical decision. $P<0.05$ was considered significant.

RESULTS

Out of the 200 experimental fish samples (*Clarias gariepinus)* examined, 74 (30.00%) were infected, giving a total infection rate for African Catfish in River Nasarawa (Table 1).

Fishes with standard length range of 21-30cm were most infected with a prevalence of 35.20%. This was followed by fishes within the length range of 11-20cm with a prevalence rate of 25.00%. Fishes with less than 10cm had the least prevalence rate of 17.14% (Table 1). It was observed that the female *C. gariepinus* had higher percentage prevalence (33.66%) than the male (26.26%) (Table 2).

The gastrointestinal helminth parasites recovered comprised of a species of nematodes- *Procamallanus spp.* (20.27%), two species of cestode-

Polyonchobothrium spp. (24.32%); and *Diphylobothrium latum* (13.52%) then two species of protozoa *Protopalina* spp. (14.86%) and *Hexamita* spp. (27.02) (Table 3).

The fish with body weight less than 100g has the highest rate of infection, with prevalence of 42.85%. The lowest prevalence rate of 12.50% was recorded in body weight range of 401 and above (Table 4).

Table 1: Prevalence of Gastrointestinal Parasites in Relation to their Standard Length

Standard length (cm)	Number of fish examined	Number of fish infected	Prevalence (%)
1-10	35	3	17.14
11-20	40	10	25.00
21-30	125	44	35.20
Total	**200**	**74**	**40.00**

Table 2: Sex Prevalence of Gastrointestinal Parasites in comparative to category of Sex

Sex	Number of fish examined	Number of fish infected	Prevalence (%)
Male	99	26	26.26
Female	101	34	33.66
Total	**200**	**60**	**30.00**

Table 3: Prevalence of the Gastrointestinal Parasites in Relation to Location of Parasites

Parasite species	Taxonomic group	Number of Parasites isolated	Location of parasites	Number of fish infected	Prevalence (%)
Procamallanus spp.	Namatode	15	Oesophagus & stomach	11	20.27
Polyonchobothrium spp.	Cestode	18	Intestine	19	24.32
Diphylobothrium latum	Cestode	10	Intestine	20	13.51
Protopalina spp.	Protozoa	11	Intestine	8	14.86
Hexamita spp.	Protozoa	20	Intestine	2	27.02
Total		**74**		**60**	

P<0.05

Table 4: Prevalence of Gastrointestinal Parasites in Relation to their Body Weight

Weight (g)	Number of fish examined	Number of fish infected	Prevalence (%)
1-100	35	15	42.85
101-200	47	10	21.28
201-300	90	30	33.33
301-400	20	4	20.00
401 and above	8	1	12.50
Total	**200**	**74**	**30.00**

DISCUSSION

This current study revealed that *Clarias gariepinus* were infected with gastrointestinal parasitic worms (30.00%) in Nasarawa Local government are of Nasarawa state. In this study, a total of five species of helminths from Three classes were recovered. The only species of nematode species found was *Procamallanus spp.,* the two Cestodes species encountered comprised of *Polyonchobothrium spp.* and *Diphylobothrium latum* then two species of protozoa; *Protopalina* spp. and *Hexamita* spp. were recovered. This survey is in agreement with findings of other researchers; God'spower *et al.,* (2016) who identified cestode and nematode in cultured *C. gariepinus* in Abuja. Aliyu and Solomon (2012) also reported the nematode; *Procamallanus laevionchus* and the cestode; *Polyonchobothrium clariae* in *C. gariepinus* from lower Usman Dam, Abuja. Yakubu *et al.* (2012), found *C. gariepinus* infected by *Procamallanus laevionchus* in River Uke, Plateau State. Dan-kishiya and Zakari (2017) who identified the Cestoda, Nematoda and Trematoda, in wild *C. gariepinus* in Gwagwalada, Abuja.

Overall prevalence of intestinal parasites in this study was relatively higher than the 22.33% recorded in lower and upper River Benue (Uruku and Adikwu, 2017)

however, this value was lower if compared with 48.63% in the study recorded in the same region (Omeji *et al.,* 2014). It was observed that fishes with standard length range of 21-30cm (35.20%) were more infected than those with length of 11-20cm (25.00%) and smaller fishes of less than 10cm (61.5%). The prevalence of infection was higher in bigger fishes than in smaller fishes. This could be as a result of larger fish is more exposed to environment for search of food that could result to predispose to various parasites (Ogbu, 2019). Different parasites isolated from the fish sample were from Protozoa, Nematode, and Cestode taxonomic group. The number of protozoans isolated was higher than nematode and cestode with intestine having more parasites than stomach and this could be attributed to the presence of digested food, this finding is in agreement with the finding (Omeji *et al.,* 2014). The result showed a prevalence of 33.66% for the female whereas the male was 26.26% however; there was no statistical significant difference in prevalence of intestinal parasite between male and female *Clarias gariepinus.* This finding is in disagreement with the finding of God'spower *et al.,* (2016); Emere and Dibal (2014), who recorded significance difference in the prevalence of infection between the two sexes. Factors such as contaminated water and availability of the intermediate host harboring the infective larval stage, predisposes both sexes to risk of acquiring the infection while feeding. The high prevalence recorded on the female fish could be due to their increased rate of food intake to meet their food requirements for development of eggs which might have exposed them to more contact with the parasites (Lagrue *st al.,* 2018). This study shows higher rate of parasitic infection in the larger fish with weight of (201-300g), this is an indication that the weight of the fish could be an important in determining the parasite load. The length classes within the range of 21-30cm recorded the highest prevalence of parasitic infection compared to the small fish, this finding confirms the work of (Auta *et al.*, 2011) who observed that the condition of infection was age factor. The higher prevalence of protozoa (41.89%) than cestode (37.83%) and nematodes (20.27%) revealed that protozoa were the commonest infection of wild catfish (*C. gariepinus*) in river Nasarwa and this is in contrast with the findings of God'spower *et al.,* (2016); Aliyu and Solomon (2012) that nematodes were more prevalence in *C. gariepinus*. Though some earlier works reported that Acanthocephalan was the commonest parasites of fresh water fishes in the tropics, none was discovered in this research. Goselle *et al*. (2019) and few others showed that parasites have preference for region of attachment in the alimentary canal of fish. In this study, the distribution of gastrointestinal parasites in the fishes showed a clear preference for the intestine, stomach as sites of attachment which could be attributed to the availability of food in these regions. The highest prevalence of parasites in the intestine implies that it is a more preferred predilection site; this could be due to the favourable conditions that enhance their survival (Owolabi, 2015). The protozoa and cestodes were recovered from intestine, whereas the found in stomach. Nematodes have relatively developed alimentary canal and could easily move around any area of the host alimentary canal to feed on digested and semi-digested food, whereas, protozoa and cestodes lack alimentary system and are dependent on tissues or digested food of the host which is then absorbed through the cell/body surfaces (Yakubu *et al.,* 2012). These could probably account for their preference for these sites. 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 and on human health (Yakubu *et al.,* 2012).

CONCLUSION

This present study show that, both sample areas (point A and B) of river Nasarawa had high prevalence of helminths infestation however higher prevalence was recorded in females than males also in smaller fishes than bigger.

Since it has been observed that helminth parasite infection of fish affects its productivity, marketability, palatability, death of a good number of fishes especially in the wild as well as the potential zoonotic effect on the consumers, it is therefore necessary to develop effective control measures and good culinary practices should be adopted to decimate the potential risks to human health (Uruku and Adikwu, 2017).

Government officials should implement rules on reducing the activities such as laundering, bathing and swimming around rivers and streams as seen in river Nasarawa to check pollination of water bodies and introduction of parasites species. Sanitary disposal of wastes should be adopted by members of the community to prevent contamination of our immediate water bodies. It is advisable for individuals to thoroughly cook or heat fish before consumption to prevent zoonosis which is transmissible via partially or imperfectly cooked infected fish.

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