Survey of Piscine Parasites of Fish Species Sold at Damaturu, Yobe State, Nigeria

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Abstract

The present study investigated the prevalence of gastrointestinal parasites in *Clarias gariepinus* obtained from five different farms in the Damaturu metropolis. A total of 50 fish samples, 10 from each farm, were examined for the presence of gastrointestinal parasites. The results revealed an overall prevalence rate of 47 (100%) among the samples. Among the farms, MBG, WIB, and AMR farms exhibited the highest prevalence rates at 21.28%, followed by OMR farm at 19.14%, and SSM farm at 17.02%. These findings suggest variations in the prevalence of gastrointestinal parasites among the different farms. Additionally, the study explored the relationship between the gender of the fish and the prevalence of gastrointestinal parasites. Out of the 50 samples examined, 47 (100%) tested positive, with 24 (51.07%) positive samples among males and 23 (48.93%) positive samples among females. Males showed a higher prevalence compared to females, indicating a gender-based difference in susceptibility to gastrointestinal parasites. The distribution of gastrointestinal parasites was also assessed in relation to the weight (g) and length (cm) of the fish. The highest weight and length relationship were observed in fish from MBG farm, while the lowest weight and length were recorded in AMR farm samples. These differences in weight and length among fish samples from different locations highlight potential variations in environmental conditions that may influence the prevalence of gastrointestinal parasites. It was therefore recommended to create community awareness campaign on the health implication of these parasites which are harmful to both humans and the fishes.

Keywords: *Clarias gariepinus*, Damaturu, Piscine parasites, prevalence, weight and length relationship

INTRODUCTION

Parasites across different aquatic habitats have infected fish species, inflicting injuries, which become a substrate to other opportunistic microorganisms reducing fish production as a result of the menace they cause (Danyaro et al., 2018). Parasitic infections pose a significant threat to public health and have the potential to cause widespread diseases in humans. Among the various types of parasites, helminths, which include worms such as nematodes, trematodes, and cestodes, are of particular concern due to their ability to infect various organisms, including fish (Dankishiya et al., 2013). Fish consumption is a common dietary practice worldwide, as fish is a valuable source of essential nutrients. However, the presence of helminth parasites in fish can not only compromise their quality but also pose health risks to consumers (Auta et al., 2019). Parasitic diseases of fish, many of which are free-living in the aquatic environment. Typically, no intermediate host is required by the parasite to complete its life cycle. Consequently, they build up to very high numbers when fish are crowded commonly in culture systems, causing weight loss, debilitation, and mortality (Uruku and Adikwu, 2017). A number of fish parasites have been discovered to be of known zoonotic potential to mammalian host including man therefore, making them of public health importance (Dankishiya et al., 2019). The consumption of fish is a significant component of the diet in many communities worldwide, providing essential nutrients and contributing to food security. However, fish can serve as hosts to various parasites, including helminths, which are multicellular organisms commonly known as worms. These parasites can have detrimental effects on both human health and the aquaculture industry (Adebambo et al., 2020). Understanding the prevalence of helminth parasites in fish sold in specific regions is crucial for implementing effective control measures and ensuring the safety of fish consumers. In view of the forgoing this research aimed at determining the prevalence and diversity of helminth parasites in fish species sold at Damaturu fish market, Yobe State, Nigeria.

Materials and Methods

Study Area

Damaturu is the capital city of Yobe State, which is located in the northeastern part of Nigeria. Yobe State is one of the 36 states in Nigeria and was created on August 27, 1991, from the old Borno State. Damaturu serves as the administrative, economic, and cultural center of the state. Geographically, Damaturu is situated in the semi-arid Sahel region, characterized by a hot and dry climate. The city is located at the coordinates of 11°44'N latitude and 11°58'E longitude. It is bordered by the states of Borno to the east, Jigawa to the south, and Niger Republic to the north.

Economically, Damaturu serves as a commercial hub for the surrounding agrarian communities. Agriculture, trade, and livestock farming are major economic activities in the area. Crops such as millet, sorghum, cowpea, and sesame are cultivated, while livestock rearing, especially cattle, plays a significant role in the economy.

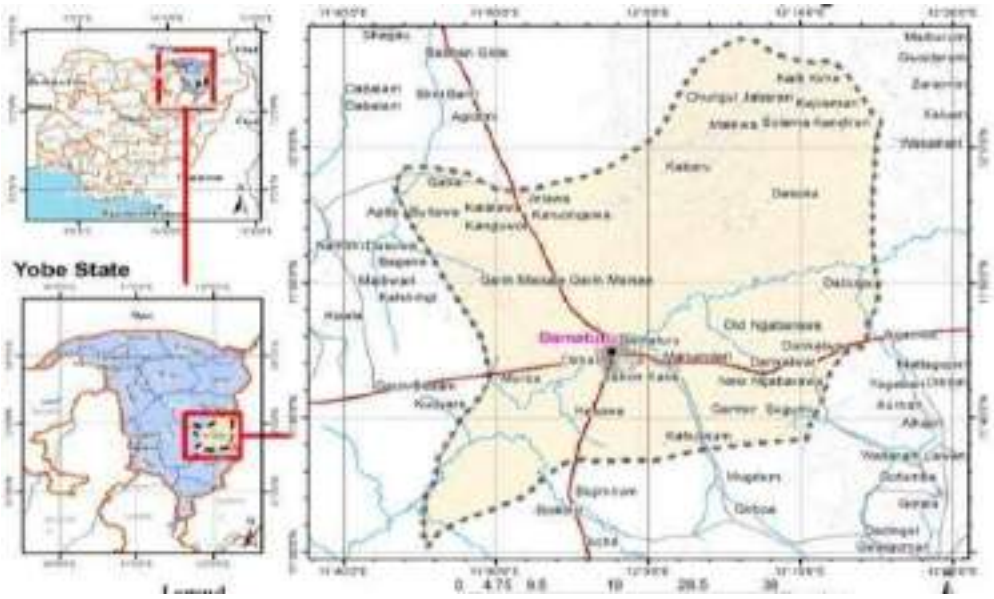

Figure 1: Showing the map of Damaturu, Yobe State

Sample collection

Dissection and Examination for Parasite

The fishes were euthanized 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 the pectoral fins level using a surgical blade as adopted by Auta et al. (2019).The gills and skins of the fish were screened in the laboratory for ectoparasites, using hand lens. Skin smear was made with scalpel blade as described by Omeji et al. (2010). The scalped samples of mucus together with the tissues were placed on the Petri-dish containing 3mls of 0.9% saline solution and stirred using a mounted pin. Three drops of the aliquot were placed on a clean slide and covered with a cover slip prior to examination under 10× and 40× objectives of the compound microscope. Gills examination was achieved in a similar way using anatomical needle as adopted by Auta et al. (2019). For endoparasites examination, the stomach and intestine of the fish were cut open with a sterile pair of scissors and surgical blade to expose the organs; content of the organs was washed into the Petri-dish containing 3mls of saline solution. 3 drops of the mixture were placed on the slide and covered with cover slip and mounted under compound microscope for endoparasites observation.

Fish Parasites Identification

The content of each section was examined for parasites under a dissecting microscope. Parasites found were counted, fixed and preserved in 10% formalin and identified using procuder adopted by Danyaro et al (2018).

Determination the Intensity of the Gastrointestinal Parasites

Procedure adopted by Ghoke *et al.*, (2012) was used to determine the intensity of the gastrointestinal parasites. Based on Egg per gram (EPG) of feacal samples. EPG = Number of eggs x 100 (where 100 is the dilution factor). Three classes of severity of the infection was used as follows; <500 (+), between 500 and 1000 (++) and more than 1000 (+++).

STATISTICAL ANALYSIS

Data obtained from the study were analyzed using Chi-square test in SPSS 16 version. The level of significance was set at $P<0.05$.

RESULTS AND DISCUSSION

The overall prevalence of gatrointestinal parasites of study area was found to be 47(100%) out of 50 samples examined (Table 1). The prevalence of gastrointestinal parasites of fish from five different farms were recorded, 10 samples were examined from each farm which gives a total of 50 samples, and 21.28% from MBG, WIB and AMR were the highest percent follow by 19.14% from OMR Farm and the least were 17.02% from SSM farm respectively.

The prevalence of gastrointestinal parasites of fish in relation to gender observed is shown on Table 2. The distribution was analyzed, out of 50 samples the total of positive sample was 47(100%) and 3(100%) were negative the number of male samples examined were 25, the positive observed was 24(51.07%) with 1(33.33%). while the number of female samples examined were also 25, the positive observed was 23(48.93%) and negative observed was 2(66.67%) which shows that males fish has the highest prevalence than females.

Table 3 shows the identified parasites. These were *Ascaris lumbricoides, Hookworm spp, Tapeworm, Roundworm, Ringworm, Taenia spp, Diphyllobothrium latum, Fasciola spp, Hymenolepis nana, Entermoeba histolytica, Entermoeba coli, Schistosoma japanicum.* The distribution of gastrointestinal parasites of fish with weight (g) and length (cm) has shown in table 4 from five different locations in Damaturu metropolis.

Table 5 shows the Total overall percentage of weight (g) and length (cm) of fish from five samples locations. The highest gram and length examined was from MBG and the least gram and length out of all the samples was observed in AMR farm. MBG has a total overall of 1241.1(26.31%) weight and 193.64(21.70) length, SSM has a total overall of 892.8(18.92%) weight and 177.7(20.03%) length, WIB has a total overall of 857.6(18.19%) weight and 177.8(20.04%) length, AMR has 798(16.91%) weight with 157.2(17.72%) length and weigh of 927.6(19.67%) and 182(20.51%) length from OMR was also observed.

Table 1 Prevalence of Gastrointestinal Parasites of fish from five Different farms

S/N	Farm	No examined	No positive	Percentage(%)	No negative	Percentage(%)
1	MBG	10	10	21.28	0	0
2	SSM	10	8	17.02	2	66.67
3	WIB	10	10	21.28	0	0
4	AMR	10	10	21.28	0	0
5	OMR	10	9	19.14	1	33.33
	Total	**50**	**47**	**100%**	**3**	**100%**

Table 2 Prevalence of gastrointestinal parasites of fish with respect to sex

Sex	No examined	No positive	Percentage(%)	No negative	Percentage(%)
Male	25	24	51.07	1	33.33
Female	25	23	48.93	2	66.67
Total	**50**	**47**	**100%**	**3**	**100%**

Table 3 Overall Prevalence of Parasites Identified Parasite from Five Farms

S/N	Identified Parasites	MBG	SSM	WIB	AMR	OMR	Total	(%)
1	*Ascaris lumbricoides*	4	5	7	6	9	31	20
2	*Hookworm spp*	8	9	10	1	6	34	22
3	*Tapeworm*	1	3	0	0	3	7	5
4	*Roundworm*	0	0	1	3	0	4	3
5	*Ringworm*	0	0	0	1	0	1	1
6	*Taenia spp*	3	2	3	1	6	15	10
7	*Diphyllobothrium latum*	1	4	3	2	5	15	10
8	*Fasciola spp*	0	2	1	3	0	6	4
9	*Hymenolepis nana*	4	5	2	6	2	19	13
10	*Entermoeba histolytica*	3	2	2	4	1	12	8
11	*Entermoeba coli*	0	1	1	2	3	7	5
12	*schistosoma japanicum*	0	0	0	1	0	1	1
	TOTAL	**24**	**33**	**30**	**30**	**35**	**152**	**100**

Table 4: Mean length-weight relationship of fish from five different farms

Farm ID	Weight (g)	Percentage (%)	Length (cm)	Percentage (%)
MBG	1241.1	26.31	192.64	21.70
SSM	892.8	18.92	177.7	20.03
WIB	857.6	18.19	177.8	20.04
AMR	798	16.91	157.2	17.72
OMR	927.6	19.67	182	20.51
TOTAL	**47.17.1**	**100%**	**887.32**	**100%**

DISCUSSION

This study has found an overall prevalence of 47(100%) out of 50 samples examined as shown in Table 4.1. The prevalence of gastrointestinal parasites of fish from five different farms was observed, 10 samples were examined from each farm which gives a total of 50 samples, and 21.28% from MBG, WIB and AMR were the highest percent follow by 19.14% from OMR Farm and the least were 17.02% from SSM farm respectively which is similar to 47% the prevalence of Hookworm infections among school-aged children in Okuta Community, Kwara State, Nigeria (Babamale *et al*., 2015), and 45% prevalence of Intestinal Helminthiasis among malnourished school children in pre-Urban area of Ibadan, Oyo State (Adeyeba and Tijani, 2002), The manifestation of these parasites is due consumption of contaminated food or water.

The prevalence of gastrointestinal parasites of fish in relation to gender observed is shown on Table 4.2. The distribution was analyzed, out of 50 samples the total of positive sample was 47(100%) and 3(100%) were negative the number of male samples examined were 25, the

positive observed was 24(51.07%) with 1(33.33%). while the number of female samples examined were also 25, the positive observed was 23(48.93%) and negative observed was 2(66.67%) which shows that males fish has the highest prevalence than females.

Table 4.3 shows the identified parasites. These were *Ascaris lumbricoides, Hookworm spp, Tapeworm, Roundworm, Ringworm, Taenia spp, Diphyllobothrium latum, Fasciola spp, Hymenolepis nana, Entermoeba histolytica, Entermoeba coli, Schistosoma japanicum.* The distribution of gastrointestinal parasites of fish with weight (g) and length (cm) has shown in table 4.4 from five different locations in Damaturu metropolis. This observation is similar to Ekanem et al. (2011) and Onyedineke et al, (2015) who reported higher number of nematodes than other parasites. According to Ekanem et al, (2011), nematodes are known to occur in body cavities and subcutaneous tissues. Host specificity of nematodes agrees with the findings of Akinsanya et al . (2014) and Onyedineke et al, (2011).

This finding also supports the work of Rosas-Valdez and Perez-Ponce de Leon (2011) who reported that parasites show some level of preference for the host they parasitize. According to Kabata (2012) Clinostomum (trematode) when ingested with under-cooked fish is capable of producing laryngopharyngitis which is an unpleasant inflammatory condition in man.

Table 4.5 shows the Total overall percentage of weight (g) and length (cm) of fish from five samples locations. The highest gram and length examined was from MBG and the least gram and length out of all the samples was observed in AMR farm. MBG has a total overall of 1241.1(26.31%) weight and 193.64(21.70) length, SSM has a total overall of 892.8(18.92%) weight and 177.7(20.03%) length, WIB has a total overall of 857.6(18.19%) weight and 177.8(20.04%) length, AMR has 798(16.91%) weight with 157.2(17.72%) length and weigh of 927.6(19.67%) and 182(20.51%) length from OMR was also observed which is similar to Onyedineke et al. (2015) who reported the prevalence of parasites in relation to length classes for all the species, 30-10-19.9 cm (standard length) recorded the highest number of parasites which disagrees with Ekanem et al. (2011) who reported highest prevalence for all the species in length class 30-39.9cm. This variation in the parasitological load could be due to the differences in the environmental status of the study area, immunity, age, feeding frequency, and breed among other factors as reported by Iqbal et al. (2018). The sex related parasitological load could be due to the variation in daily feed intake, immunity among other factors Parasites studies of *Oreochromis nilotius* carried out Biu u *et al*. (2014), in Maiduguri, North East, Nigeria revealed blood parasite *Haemogregania* as the most prevalent ($P<0.05$). Biu *et al*. (2014) reported that female fishes were more parasitized than males with 26.7% and 25.7% prevalences respectively ($P<0.05$). Parasito fauna survey of fishes in Warri, carried out by Vincent *et al.* (2014) revealed overall prevalence of 32.9%, The break-down included; *Tilapia zilli*(23.8%), *Synodontis clarias*(39.1%) *Chrysicthys nigrodigitatus* (30.4%) *Clarias angullaris* (50.0 %), *Hepsetus odoe* (37.5 %). The infection rates were Acanthocephalan (75.6%), Nematode (22.2%). This is contrary to the findings of Iyaji *et al.*(2015), Okoye *et al.* (2014) where Acanthoceplalan were not recorded in total abundance. In Gombe, North East Nigeria, Dauda *et al.* (2016) reported prevalence of gastrointestinal helminths of *Tilapia zilli* as 42.7%, while Gombe market had 17%, Gwadon market (15.0%), Gombe old market (0.705%); with no helminths found in gills of infected fish. This report is similar to Goselle *et al.* (2008). The prevalence report in Gombe is lower than that of

Bichi and Ibrahim (2009) in Kano (53.40%) as well as Olofintoye (2006) in Ekiti (60.23%). Hassan *et al. (*2010) recorded 68.57% prevalence in *Clarias gariepinus* and *Synodotis clarias* in Lekki lagoon with multiple infections in some infected specimens. The study on gastrointestinal helminthes parasites of wild *C. gariepinus* in Gwagwalada, Nigeria showed that the fishes were infected with 3 species of parasites involving the cestodes (*Wenyonia* sp.), Nematode (*Procamallanus laevionchus*) and Trematode (*Euclinostomum heterostomum*).This is in conformity with other researchers. Dankishiya and Zakari (2007) identifed the Cestodes, Nematode and Trematode, in wild *C. gariepinus* in Gwagwalada.

CONCLUSION

The findings in this study confirmed the presence of gastrointestinal parasite in fish from five different farms in Damaturu, Yobe State with prevalence comparable to rates reported in various locations within Nigeria and outside Nigeria. Parasitic infection in fish is still a topic of great concern because of its high consumption rate globally. The public health importance is also a great concern if the parasitic infection is omitted. Interim it is warranted to investigate the risk factors involved in parasitic infection in fish and randomly screen of fish farm from different areas prior to receiving chemotherapy.

RECOMMENDATIONS

1. People should ensure the healthy and hygienic of fish before consumption and avoiding eating raw or undercook fish
2. Fish farmers should ensure the sanitary condition of the fish pond by regular checking, proper monitoring and implementation of recommendations
3. Community awareness campaign on the health implication of these parasites which are harmful to both humans and the fishes, this will minimize the risk and occurrence of parasitic infections.

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