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OCCURRENCE OF GASTROINTESTINAL PARASITE IN SILVER CATFISH (*Bagrus bajad*, FORSSKALL, 1775) IN ZOBE RESERVOIR, KATSINA STATE NIGERIA

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ABSTRACT

A study of *Bagrus bajad* of Zobe artificial lake was conducted between October and December, 2023 to determine the presence of gastrointestinal parasitic worms infestation in *Bagrus bajad*. A total of 108 live fish samples of *Bagrus bajad* were collected from fishermen at the investigation places, fish samples were randomly collected weekly from three (3) selection locations from fish men using various fishing gears (Long line, nets and Traps). Out of 108 fish samples from Zobe, 29 were male and 79 were female. Female fish samples had a comparatively greater number of infected 49 whereas the male fish samples documented 21. Fish parasites recovered and their prevalence among *Bagrus bajad* obtained from Zobe reservoir includes; *Asiostrema spp*21 (30.00%), *Metacercarriae spp*17(24.29%), *Ascaris spp 21*(30.00%) and *Acanthosentis tilapia* 11 (15.71%). *Bagrus bajad* sampled obtained from Zobe indicated among the silver catfish experimented from Zobe Reservoir, the intestine were the most infected 40 (57.14%) of tissues examined, followed by the stomach with 30 (42.86). Fishes such as *B. bajad*, *S. mystus*, *C. gariepinus* and *C. Zilli* from the Zobe reservoir should be cooked properly or be on fire before eating to shun health threat due to consumption of the fish parasitic worms.

Keywords: Occurrence**,** *Bagrus bajad*, Gastrointestinal, parasites, silver catfish, Zobe Reservoir

INTRODUCTION

Fish parasites, can develop into opportunistic parasitic worms. Some fish parasites are free-living, but parasitic worms require hosts to survive and reproduce. Both oblige and individually opportunistic parasitic worms have been found in (hosts); oblige parasitic worms are typically responsible for the majority of parasitic illnesses in fish (Sadauki *et al.*, 2022a). Certain parasites such as (protozoan, nematode, cestode, metazoan, and crustacean parasitic worms) in fisheries and aquaculture may be very pathogenic, contributing to high fish mortality rates and financial losses or exerting pressure on the diversity and richness of native fish species (Sadauki *et al.*, 2022a). Fish carry all of the major parasitic worm species, and even seemingly healthy wild fish frequently have high parasitic burdens. The occurrence and intensity of parasitic infestations are closely connected to the ecological situations of the water body and the wellbeing status of the fish (Sadauki *et al.*, 2023). Some parasitic worms are foreseeable due to their regular prevalence and lack of host specificity, however information about specific fish hosts is crucial for the identification of parasitic worms with discernible host and tissue specialisation (Uneke and Egboruche, 2015). Examining recently made smears that include live parasitic worms is typically diagnostic. Fish do have parasites and illnesses much like humans and other animals do. Fish have both non-specific and specialised defences against infections and illnesses. Scales, gills, skin, and the slime layer generated by the epidermis are examples of non-specific defences. These elements deceive bacteria and impede their growth. When parasites and diseases overcome these defences, fish may experience inflammatory reactions that increase the flow of vital blood to infected areas and move white blood cells in an attempt to harm the pathogens (Uneke and Egboruche, 2015).A common parasitic disease called helminthiasis is brought on by an infestation of nematodes, monogeneans, trematodes, cestodes, and acanthocephalans. A few of these helminths have a three-host life cycle, with fish serving as the secondary host, freshwater snails or crustaceans as the major or principal host, and piscivorous birds or mammals as the final host. Because of their pathogenicity to fish in both the wild and culture environments, these helminth parasites have drawn a lot of attention. For instance, fish eyes and brain cavities may harbour metacercarial stages of certain trematodes, such *as Diplostomum spp*. (Chibwana, 2018). Numerous protozoan, metazoan, and crustacean parasitic worms have been documented to use tropical freshwater fishes like *Bagrus bayad*, *Oreochromis niloticus*, *Coptodon zilliisillies*, and *Clarias gariepinus* as definitive or intermediate hosts. It has been noted that parasitic infection and parasitism in fish negatively affect production and the sustainability of fish farming. The health of the fish and the environmental conditions of the body of water have a direct impact on the incidence and severity of parasite diseases (Sadauki *et al.*, 2023).

Emergencies of fish parasites brought on by helminth infestations are a significant issue in aquaculture. It impairs fish in their normal state of health, results in fish mortality. Because healthy fish stocks are the primary means of achieving increased fish output, effective research on fish parasitology is crucial to various fisheries development programmes (Hazarika

and Bordoloi, 2022). Fish parasite research is vital because it helps fish live better lives in their natural habitat and provides knowledge about possible infections and diseases linked to Nigerian fisheries and fish farming (Adegoroye *et al.,* 2019). In view of the significance of catfish to diet production in addition to the increasing interest in aquaculture sub-sector in Nigeria, it is needed to study the prevalence of gastrointestinal parasites in *Bagrus bajad* in Zobe reservoir in Katsina State, Nigeria.

MATERIALS AND METHODS

Study Area

The Zobe reservoir is positioned on latitude (12° 20' 34.62N to 12° 23' 27.48N) and Longitude (7° 27' 57.12E to 7° 34' 47.68E) in part of Dustin-ma and Matazu Local Government area of Katsina State, Nigeria. It covers an area of approximately 968,544 km^2. The Zobe artificial lake it is impounded from two main rivers, river Gada and river Karaduwa. The Zobe artificial lake built on the River Karaduwa has a total length of approximately 7 km and an area of approximately 4,500 hectares, with annual rainfall of 600 to 700 mm and annual average temperature of approximately 25°C . For the purpose of this study, three main sites nearby the reservoir were cautiously selected: Location A, Location B, and Location C (Sadauki *et al.,* 2022b).

Samples collection

A total of 108 live fish samples of *Bagrusbayad* were collected from fishermen at the sample locations, fish samples were randomly collected weekly from three (3) selection locations from fish folk using various fishing gears (Long line, nets and Traps) carefully chosen to represent a given population of *Bagrus bayad*, of each reservoir for three month (October, 2023 and December, 2023). The fish samples as soon as collected were promptly transported to the Biology Laboratory, Federal University Dutsin-Ma, in an ice chess container for helminth examination (Sadauki *et al.,* 2022a).

Identification of Experimental Fish *Bagrusbayad*

The experimental fish were identified using the description of (Olaosebikan and Raji, 2013).

Sexing of Experimental Fish

Sexing of samples was done after careful physical observation of the urogenital papillae. Observation of the testes in male and with round opening papilla in the female was confirmatory (Nababa *et al.,* 2019).

Measurement of Experimental Fish

Standard lengths were measured with a metric ruler, and weights were measured with a top loading sensitive balance using the method as describe by Sadauki *et al.* (2023).

Examination of specimens for parasites

The fishes samples were dissected according to the method described by Noga (2010),the alimentary canals were removed and cut into two part stomach and intestine. The gastrointestinal tract was used for parasitic examination because this is where food is most abundant for the parasites. Each section was placed separately in Petri dishes containing 0.9% normal saline. Each section was slit longitudinally and examined for parasites under a dissecting microscope between 10 and 40X magnification. The recognition of the worms or larva was simply enhanced by its wriggling movement in the normal saline solution under a microscope. Fish parasites recovered were counted and after that fixed and preserved in 5% formalin (Sadauki *et al.,* 2022a).

Identification of parasitic worms

The intestinal helminths parasites were identified by morphological and parasitological techniques using standard identification keys and pictorial guides by Kabata, (1985)Paperna, (1996) and Pouder *et al*. (2005).

Parasite Prevalence and Intensity Estimation

The prevalence of parasitic worm's infestation was calculated for sex, location, length and weight using the model describe by Sadauki *et al.* (2022a):

$$\text{Prevalence (\%)} = \frac{No\ of\ fish\ host\ infectedx100}{\text{Total no.of fish host Examined}}$$

$$\text{Percentage of infection (\%)} = \frac{Number\ of\ a\ specific\ parasite\ in\ the\ sample \times 100}{Total\ number\ of\ parasies\ in\ the\ sample}$$

Data Analysis

The prevalence of infestation were presented in percentage terms. Descriptive statistics, conveyed through frequencies and percentages, were utilized to explore the relationship between risk factors and the prevalence of parasites. P values were calculated for all analyses.

Results

Out of 108 fish samples of silver catfish, 29 were males and 79 were females (Table 1). Amongst the observed male silver catfish, 21 (72.41%) were discovered to be infested with endo-parasites. Whereas among the examined female silver catfish, infestation level of 62.02% was observed. Overall infection rate considering both male and female populations, the total infection rate for silver catfish in Zobe Reservoir is 70 (64.81%) (Table 1).

TABLE 1: Prevalence of Endo-parasite in Comparative to Group of Sex

SEX	No of examined	No of infected	%of infection
Male	29	21	72.41
Female	79	49	62.02
Total	**108**	**70**	**64.81**

Among silver catfish experimented from Zobe Reservoir. A total of 70 parasitis wormss were discovered in the sampled fishes examined, out of which *Astiotrema* spp 21 (30.00%), and *Ascaris spp* 21 (30.00%) had the highest occurrence. Followed by *Metacercarriae* spp 17 (24.29%), and *Acanthosentis tilapia* that had 11 (15.71%) as the least parasitic infestation.

The occurrence of the gastro-intestinal helminths according to the Class is shown in table 2, there are three Classes namely, Digeans, Nematode and Trematode. The Digeans was the dominating Class with 54.29% of the percentage of infection.

TABLE 2 Occurrence of Endo-parasite in Relation to Taxa of Parasites

Parasite	Taxo-group	Parasite Infection (n)	Prevalence of Infection
Astiotrema spp	Digeans	21	30.00
Metacercarriae spp	Degeans	17	24.29
Ascaris spp	Nematodes	21	30.00
Acanthosentis tilapia	Trematodes	11	15.71
TOTAL		70	(100)

Among the silver catfish experimented from Zobe Reservoir, the intestine was the most infected 40 (57.14%) of tissues examined, followed by the stomach with 30 (42.86%) (Table 3).

TABLE 3: Prevalence of Endo- in Comparative to Location of Infection

Parasite	INTESTINE	STOMACH
	Percentage of infection	
Astiotremaspp	6 (15.00)	9(30.00)
Metacercarriaespp	19 (47.50)	0(0)
Ascarisspp	7(17.50)	6(20.00)
Acanthosentis tilapia	8(20.00)	15(50.00)
TOTAL	**40(57.14)**	**30(42.86)**

Out of the 108 fish samples collected and examined from the three sample locations in Zobe reservoir, an percentage of infection of 70 (64.81%)was recorded (Table 4).In prevalence among fish from the various sample locations, *Bagrus bajad* obtained from Sample B 29 (80.55%) host the relatively highest percentage of parasites, followed by Sample location A 23 (63.88%), while those sampled from Sample C location had the least percentage infestation 18 (50.00%).

TABLE 4: Prevalence of Endo-parasites in Relative to Sample Location

Location	No of examined	No of Infected	Prevalence of Infection
Location A	36	23	63.88
Location B	36	29	80.55
Location C	36	18	50.00
TOTAL	**108**	**70**	**64.81**

Among experimental fish samples obtained from Zobe indicated that silver catfish with lengths of 40-45 cm harboured more worms 29 (72.50%) followed by 25.0-30.0 cm 14 (66.66%),and followed by those of 33-35 and 35-40 with 10, 10 worms and (50.00% and 52.63%) respectively, while those with lengths of 21 - 25.0 cm had lesser worm burden 7 (87.50%) (Table 5)

TABLE 5: Prevalence of Endo- parasites in Relative to length in Zobe reservoir

Fish length(cm)	No of examined	No of Infected	Prevalence of Infection
21-25.0	8	7	87.50
25-30.0	21	14	66.66
30-35.0	20	10	50.00
35-40.0	19	10	52.63
40-45.0	40	29	72.50
TOTAL	**108**	**70**	**64.81**

Among the experimental fish samples obtained from Zobe indicated that *Bagrusbayad* with weight of 161-200g harboured more worms 41 (62.12%), followed by 91-130g 11 worms (64.70%),followed by that of 131-160g with 10 worms (66.60%) while those with weight of 50-90g had lesser worm burden 8 (80.00%) (Table 6).

TABLE 6: Prevalence of Endo- parasites in relation to weight in Zobe reservoir

Fish Weight(g)	No of examined	No of Infected	Prevalence of Infection
50-90	10	8	80.00
91-130	17	11	64.70
131-160	15	10	66.60
161-200	66	41	62.12
TOTAL	**108**	**70**	**64.81**

DISCUSSION

It is interesting to observe that fish are susceptible to parasitic illnesses; this is a finding that is dependent on the type of fish and the type of water they live in, as well as specific characteristics of the water quality, such as the amount of dissolved oxygen, the amount of organic matter present, etc. An additional element that increases fish susceptibility to these parasite diseases is unfavourable environmental circumstances (Ahmed-Hamid *et al.,* 2012; Nababa *et al.,* 2023). Diseases rarely affect fish species that live in healthy ecological settings (Kawe *et al.,* 2016). Fish with altered immune systems or resistance to infection may be more susceptible to parasite establishment and infection due to abiotic variables such elevated water temperatures (Nababa *et al.,* 2023).According to Sadauki *et al.* (2023), variations in the geoclimate may play a major role in influencing not only the parasite prevalence in freshwater bodies but also the parasite communities that inhabit freshwater fish. The biology of the parasite species, including the existence of suitable intermediate hosts, fish host habitat, migratory and feeding behaviour, host diet, and host age, are additional significant factors that affect the prevalence, intensity, and diversity of parasites (Hussen *et al.,* 2012; Sadauki *et al.,* 2023).

According to data, helminths are frequently detected in all freshwater fish species. The frequency and severity of helminth infections depend on a variety of factors, including the host's feeding habits, physical characteristics, water body cleanliness, and the presence of intermediate hosts when needed (Hussen *et al.,* 2012; Nababa *et al.,* 2023).Because parasitic worms respond to anthropogenic pollution in a variety of ways, they are garnering increasing interest from parasite environmentalists as bio indicators of ecological contamination originating in social actions

(Ali *et al.*, 2015). According to this initial analysis, the infection rate of *B. bajad* parasitic worms is 64.81%.

The study's findings showed that the parasites found in *B. bajad* from the Zobe reservoir in Katsina State, Nigeria, are Nematodes, Trematodes, Digeans, and Degeans. (*Ascoris spp.*, *Acanthosentis tilapia*, *Astiotrema spp*., and *Metacercarriae spp*.) are among the parasite species.The reason why the intestine has been found to have a higher number of parasites than the stomach could be because the majority of digestion occurs there, which may cause the release of parasite eggs into food.

This is consistent with the findings of Solomon *et al.* (2018) and Nababa *et al.* (2023), who reported that there were more parasites in the intestine than in the stomach. They attributed this to a number of factors, including the presence of breakdown nutrition in the intestine or the intestine's larger/greater surface region. The hydrochloric acid content of the stomach may be the cause of the decreased number of parasites in the stomach of the fish samples linked to the intestine (Solomon *et al.*, 2018). Regarding the prevalence of parasite infestation in connection with *Bagrus bajad* sexual activity. In most cases, the prevalence rate in females was higher than in males. This may be explained by the biological/physiological condition of the fish samples from the females, and by their increased nutrient intake to meet their nutritional requirements for the development of their eggs, they may have become less protected from further interactions with the parasites, increasing their likelihood of illness or infection (Kawe *et al.*, 2016). However, the female sex reported higher infections, which may have resulted from varying levels of infection resistance as well as unequal nutrition caused by food consumption, either in terms of amount or quality (Ogonna *et al.*, 2017). This finding is consistent with that reported by Abdel-Gaber *et al.* (2015), but it is not the same as that reported by Ugbor *et al.* (2014), who found that men were more likely to have an invasion of parasitic worms.

According to the results of the current survey, adult and large fish had a higher percentage of parasitic worm infestation than smaller fish samples. The results of the current study are not consistent with those reported by Akinsanya *et al.* (2008), who found that smaller fish were more contaminated than larger fish, most likely because the smaller fish had developed resistance over time. According to Kawe *et al.* (2016), the environment is recognised to have a major impact on the prevalence of parasitic fauna. In contrast to other factors, there is a between the sampling location and the prevalence of gastrointestinal helminths in this study, but the prevalence varied from location to location, with sample location B having a significantly greater prevalence in table 4. This could be the outcome of the sites' operations and level of pollution.

CONCLUSION

The result of this study displays that helminthic parasitic worms are prevalent in the gut of *Bagrus bayad* inhabitant in Zobe reservoir. The endoparasitic fauna found were mainly *Ascorisspp, Acanthosentis tilapia, Astiotrema spp* and *Metacercarriae spp.* The outcome of this research can assist as reference line parasitological evidence for upcoming surveys to safeguard and improve the environmental potential of Zobe reservoir.

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