GASTROINTESTINAL PARASITES OF *Clariasgariepinus* FROM LOWER BENUE RIVER AT MAKURDI, BENUE STATE, NIGERIA.

***[1] Uruku N. M., [2]Agatsa D. T., [1]Oshimagye M. I. and [2]Onor E. O.**
[1]Department of Fisheries and Aquaculture, Federal University P.M.B 1020 Wukari, Taraba State. Nigeria.
[2]Department of Biological Sciences.Benue State University.P.M.B 102119 Makurdi, Nigeria.
[*]Correspondence: uruksme@gmail.com +2347035891602

ABSTRACT
Catfish (*Clariasgariepinus)* like all living organisms is susceptible to infections with various parasites. This study was aimed at determining the different classes of gastrointestinal parasites of *C.gariepinus* in Lower Benue River, Makurdi. The live fish samples were purchased from fishermen on landing sites and were transported to the laboratory. Morphometric measurement of the fish was taken with meter rule and weighing balance. The fish was dissected and the various parts of the gastrointestinal tract were examined under the microscope for endoparasites. Out of the 103 fish examined, 34 (33.0%) were infected. Nematodes (47.1%) had the highest occurrence followed by Cestodes (38.2%) and Acanthocephalans (14.7%) had the least occurrence. There was no significant difference P>0.05 in the rate of infection between sexes. The males (61.8%) had higher infection rate than females (38.2%). The incidence of endoparasites in relation to body length reveals that length group 29.0-31.9cm had a significantly higher incidence of 29.4% compared with other body lengths examined. The incidence rate in relation to body weight reveals that weight group of 81-120g (44.1%) had a significantly higher rate of infection than other weight groups investigated. The presence of these parasites could induce some pathological effects on the fishes by hampering their growth, causing tissue disruption and even death. It is therefore recommended that, Catfish (*Clariasgariepinus)* should be properly cooked before eating to avoid being exposed to the risk of infection with zoonotic parasites.
Key words: Benue River, *Clariasgariepinus*, Fishes, Gastrointestinal, Parasitism

INTRODUCTION
Parasites play an important role in the ecology of aquatic ecosystems. They can cause harm to the host by tissue damage and can also make the host more susceptible to secondary infection, by weakening host immunity and subsequent economic losses resulting from fish mortality Madanire *et al*. (2010). Parasites of fish are of concern since they often produce a weakening of the host`s immune system thereby increasing their susceptibility to secondary infections, resulting in the nutritive devaluation of fish and subsequent economic losses (Ekanem*et al*., 2011).

The internal or endoparasites of fish inhabit the digestive tract or other organs in the body while external or ectoparasites attach themselves to the gills, skin and fins of fish. Parasitism in fish is much more common and diversified in the wild than in the farms, ponds and hatcheries. Infections occur not only due to overcrowding but also due to environmental stress. As a result, fish exposed to virulent pathogens under environmental stress such as temperature, sewage, metabolic waste products of fishes, pollution and pesticides are easily infected (Goselle*et al.,* 2008).
There are noticeable documentations of parasite group of *C. gariepinus* in Nigeria (Uruku and Adikwu, 2017; LeBari*et al.*,2016; Aliyu and Solomon, 2012) and these parasite groups of fishes especially in aquaculture is in the increase. A single species of fish has been showed to be infected by up to 7 different parasitic species. For instance, there was reported occurrence of *Bothriocephalusaegypticus, Polonchobothrium species, Anometaenia species, Polyonchobothriumpolypteri, Hennegrya species, Procamallanuslaevionchus,* and*Ergasilus sari* on *C. gariepinus*(Bichi and Yelwa, 2010). On the other hand, a few parasites species could be restricted to several species of fish. *Sandoniasudensis*and *Basidiodiscusectorchi* were found restricted to four (4) species of Synodontis; *Synodontisschall, Synodontis clarias, Synodontis batensola* and *Synodontis membraneceus.* This study was to identify different class of gastrointestinal parasites of catfish (*Clariasgariepinus*) and to establish the relationship between parasitic infections to sex and weight of the fish.

MATERIALS AND METHODS
Study Area
The study was carried out in Makurdi the capital of Benue State, Nigeria located on Latitude 8°32[1]N and Longitude 7°43[1]E . The town is divided into the North and the South which is banked by the River Benue. River Benue is perennial although the water volume fluctuates with seasons and overflows its bank during the rainy season (May-October), but decreases drastically in volume leaving a tiny island in the middle of the River during the dry season (November-April). The river contains several species of fish which are of economic importance to the people of Benue State and Nigeria at large.

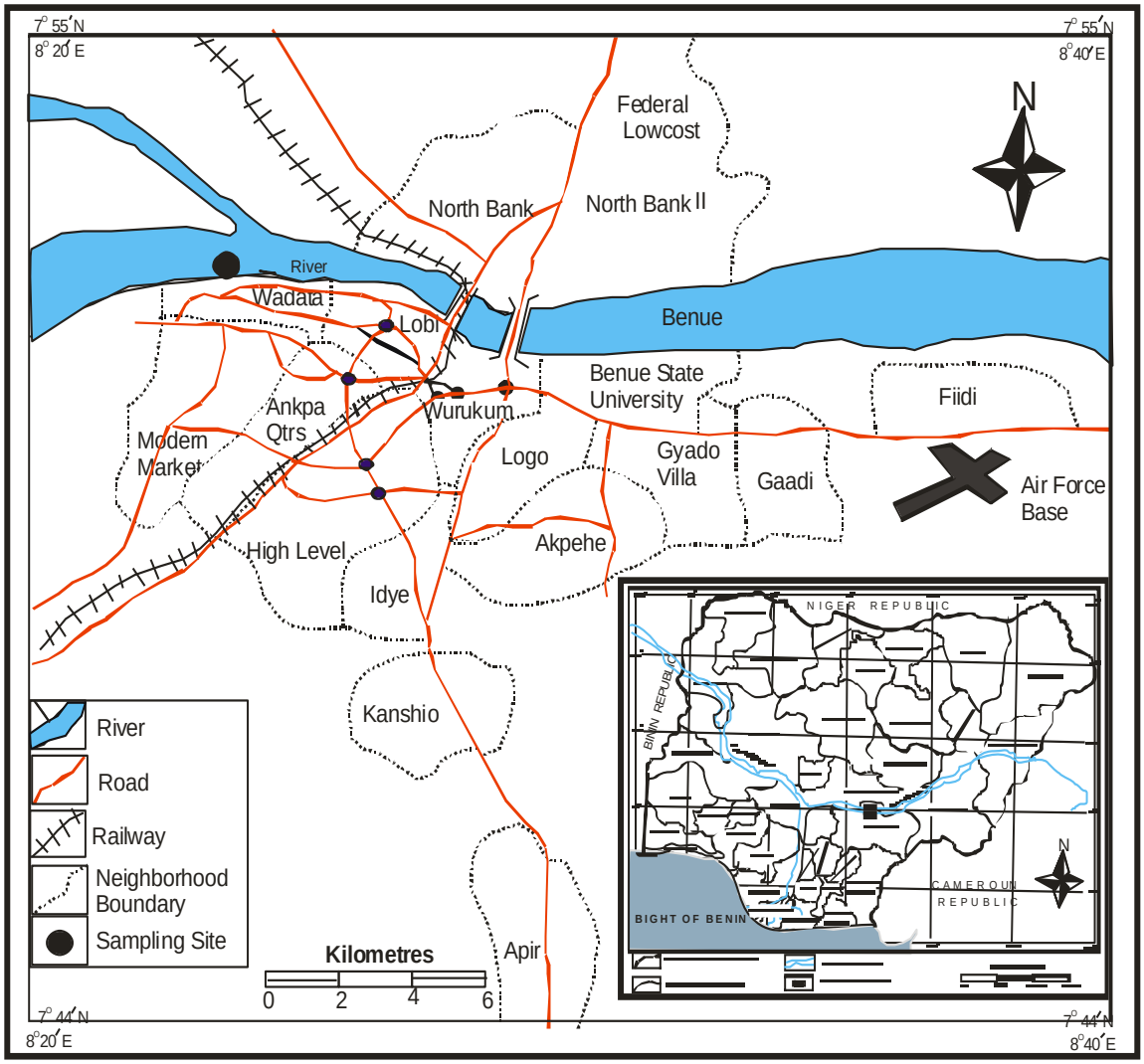

Figure 1.Map of Makurdi, Benue State showing the sampling site.

Fish Collection and Identification

A total of one hundred and three (103) fish samples were bought from fishermen at the lower Benue River Makurdi Benue State, Nigeria over a period of five months from January – May 2017. Gross physical examination of the external features of the samples were undertaken for abnormalities at the main landing site and samples were thereafter transported in a 25 liters plastic container to the Faculty of Science, Biology Laboratory, Benue State University Makurdi, for identification using the keys provided by Teugels (1986).

The total and standard lengths (cm) were measured using a measuring board (Goselle*et al*., 2008). Weight (g) was measured using a top loading weighing balance (model; mettler Toledo).

Fish were dissected to expose the alimentary canal using the techniques of Omeji*et al.* (2015) and parasites were identified to species level using the keys describes by Yamaguti (1963), Paperna (1996) and Pouder*et al*. (2011). The parasites identified were counted and recorded.

Samples from the fish that could not be examined on the same day of collection were preserved in sample bottles containing 4% formalin and labeled appropriately with the reference number. The following were estimated using the formulae:

$$\text{Prevalence (\%)} = \frac{Number\ of\ fish\ host\ infected}{Total\ nunber\ of\ fish\ host\ examined} \times 100$$

$$\text{\% parasites loads on each location} = \frac{Number\ \ of\ each\ parasite}{Total\ \ number\ \ of\ parasites\ \ examined} \times 100$$

Statistical Analysis

Chi – square was used to investigate significant differences in prevalence rates. Descriptive statistics was used to show the parasitic loads of fish associated with sex using Statistical Package for the Social Sciences (SPSS, version 22.0).

RESULTS

A total of 103 fish samples were examined and 34 (33%) were infected with gastrointestinal parasites. Figure 2 shows the prevalence of infection in relation to sex. Out of 61 males examined, 21 (61.8%) were infected, while 13 (38.2%) out of 42 females examined were infected. Although males had a higher rate of infection than females, there was no significance difference ($p>0.05$) in prevalence between the sexes, an indicator that both sexes are susceptible to infection by the parasites, and that the parasites have no preference for any sex.

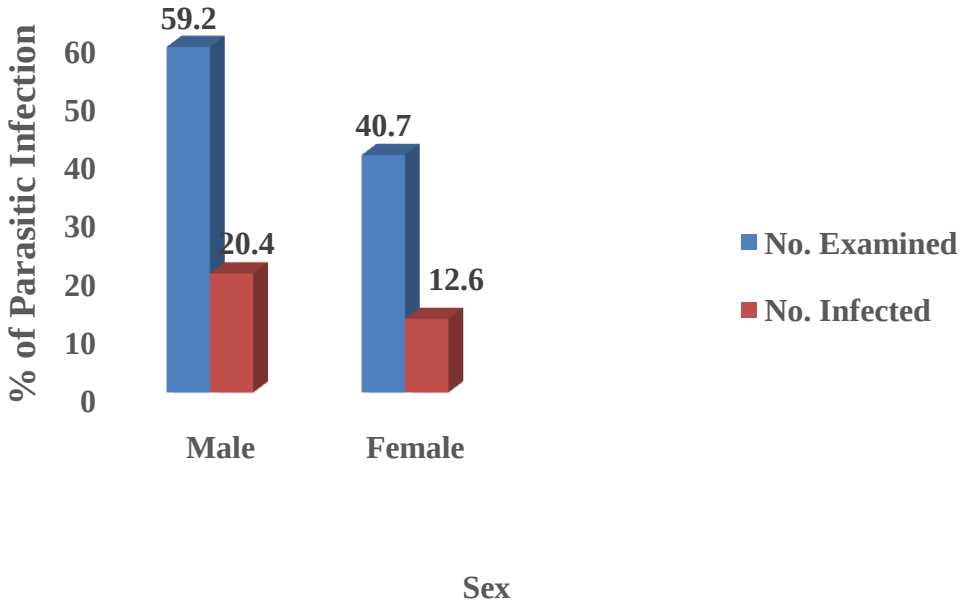

Figure 2. Prevalence (%) of gastrointestinal parasites in relation to sex

Figure 3 shows the prevalence of gastrointestinal parasites in relation to length. Length group of 29.0-31.9 (29.4%) had the highest rate of infection while 32.0-34.9 (0%) had the lowest rate of infection. There was significant difference ($P<0.05$) in the rate of infection between the standard length.

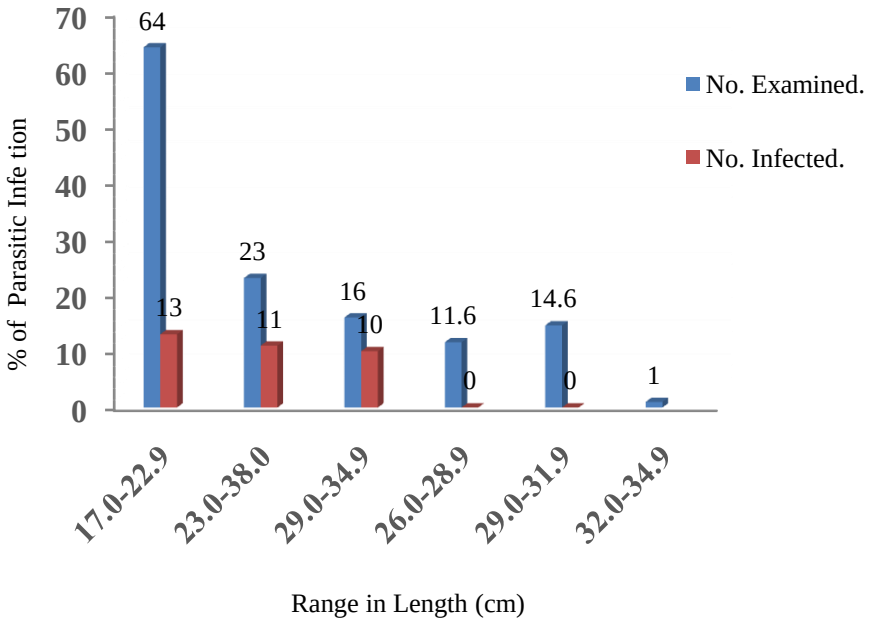

Figure 3. Prevalence of gastrointestinal parasites in relation to length

The prevalence of infection in relation to body weight as shown in Table 1 shows that body weight 81-120g (44.1%) had the highest rate of infection compared to other body weight examined. However, there was significant difference ($P<0.05$) in the rate of infection.

Table 1.0: The prevalence of gastrointestinal parasites in relation to body weight

Body weight (g)	No. Examined (%)	No. Infected (%)
41-80	41 (39.8)	6 (17.6)
81-120	44 (42.7)	15 (44.1)
121-160	5 (4.8)	4 (11.8)
161-200	2 (1.9)	2 (5.9)
201-240	4 (3.9)	3 (8.8)
241-280	7 (6.7)	4 (11.8)

χ^2=19.83(P<0.05)

Figure 4 shows the prevalence of parasites identified from *C. gariepinus. Camallanus*, *Capillaria*, *Diphyllobothriumlatum*, *Bothriocephalusacheiiognathi* and Acanthocephalan had a prevalence of 29.5%, 17.6%, 14.7%, 17.6% and 20.6% respectively.

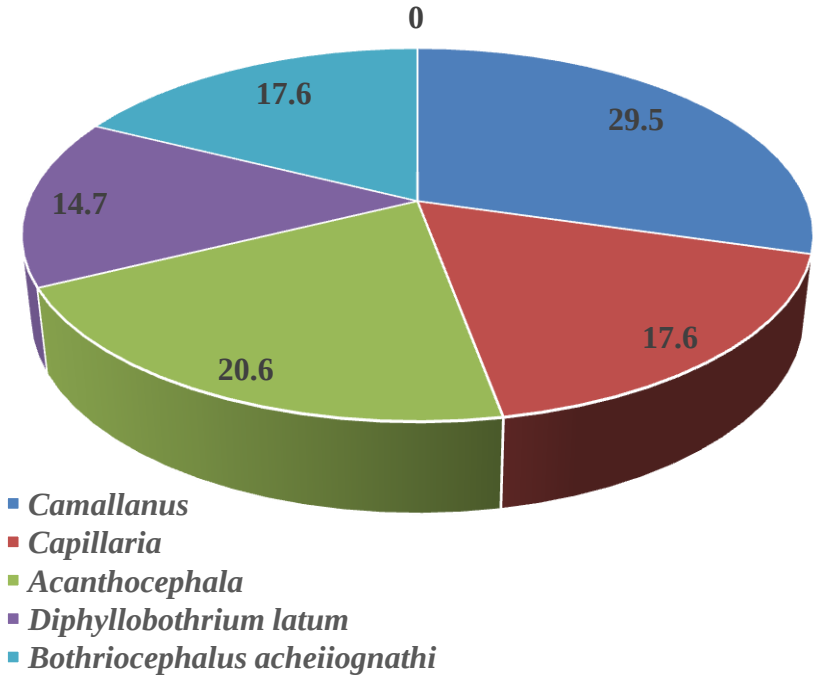

Figure 4. Prevalence of gastrointestinal parasites

DISCUSSION

This study shows overall prevalence of 33% from *Clariasgariepinus* in lower Benue River, Makurdi. The result in this study wassimilar to prevalence of 31% by Biu*et al.* (2014), 35% reported by Edeh and Solomon (2016) and 35.9% recorded by Lebari*et al*. (2016) from Maiduguri, Abuja and Port Harcourt respectively. However, this result differs from 19.17% reported by Oniye*et al.* (2004) from Zaria and 59.38% by Aliyu and Solomon (2012) from Abuja.

The difference in the prevalence of infection in *C. gariepinus* in various locations shows that parasitic infection rates differ significantly from one area to another and this can be attributed to a number of factors which are; difference in physical and chemical conditions of the water (dissolved oxygen, temperature, salt content and pH), climatic conditions of the area, season and host-parasite relationship.

The parasites recovered from this study were; *Camallanus*, *Capillaria*, *D. latum, B. acheiiognathi* and Acanthocephalan. This conforms to the studies of Goselle*et al.*, (2008); Bichi and Yelwa (2010); Omeji*et al.* (2013); Biu*et al.*, (2014); and Omeji*et al.* (2014) who have reported these parasites in *C. gariepinus* and in related species.

This study also reveals a high parasitic infection in males (61.8%) than females (38.2%); which may be due to differential feeding either by quantity or quality of food eaten or as a result of different degrees of resistance to infection. However, there was no significance difference (p>0.05) in prevalence between the sexes, an indicator that both sexes are susceptible to infection by the parasites. This agrees with findings by Omeji*et al.* (2013) who reported a higher prevalence in males from earthen ponds in Makurdi. Also, Oniye*et al.* (2004) reported a high prevalence in males than females from Zaria, Nigeria.

Finally, findings from this study revealed that fishes of higher body length and body weight were mostly infected with parasites and there was significant difference (P<0.05) in the rate of infection between

bigger fishes and smaller ones. This result is in consonance with Salawu*et al.* (2013); Ajala and Fawole (2014) and Edeh and Solomon (2016) and may be due to a change in diet from weeds, seeds, phytoplankton and zooplankton as juveniles to insect larvae, crustaceans, worms and fish at sub-adult and adult stages. These invertebrates may serve as intermediate hosts to some of these parasites. Also, the greater surface tension for infection provided by larger fishes could be accountable for higher infection in bigger fish than smaller ones.

CONCLUSION

This study reveals that catfish (*C. gariepinus*) from Lower Benue River, Makurdi harbors parasites that are of economic importance. The presence of these parasites could induce some pathological effects on the fishes by hampering their growth, causing tissue disruption and even death.

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