



Parasites Of *Heterotis Niloticus* From The Lower River Benue At Makurdi

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ABSTRACT

A study on Parasites of *Heterotis niloticus* from the Lower River Benue at Makurdi, was carried out. One hundred and twenty fish samples were parasitologically examined. Result from the study revealed the following parasites; *Eustrongylidesspp.*, *Diphilobothrium latum* and *Capillaria spp.* Parasites were found in the stomach, intestine and gills. No parasite was recorded on the skin, and the fins. *Eustrongylidesspp.*, and *Capillaria spp.* were found in the stomach, intestine, and gills; while *Diphilobothrium latum* was found only in the stomach and intestine. The intestine recorded the highest parasitic load (39.41%), while the gills recorded (33.83%), and stomach (26.77%) respectively. Parasites were more prevalent in smaller fishes of 25-40 cm total length size range. Parasites were also more prevalent in females (52.90%) while it was lowest in the males (47.10%). Based on findings from this study, it is therefore, recommended that proper handling and adequate cooking of seafood should be employed to prevent related human infections.

INTRODUCTION

Fish has been an important source of human food since time immemorial, and contains high quality proteins, vitamins, and omega-3 fatty acids, especially found in pelagic fish. The fatty acids are heart-friendly and can make improvements in brain development and reproduction (Marshall, 2011; Mu, 2014). They are widely accepted on the menu card and form a much cherished delicacy that cuts across socio-economic age, religious and educational barriers (Olorunfemi, 2014). According to Gaonkar, (2008) fish has been the most important and sustaining factor for the people around the world.

Like all wild animals, fishes could be infested by a wide variety of parasites that can be pathogenic under some circumstances. The degree of pathogenicity will depend on the number of parasites in each fish, their stage of development, location, age and size of the fish, since young fish are more likely to be damaged by parasites (Nyaku *et al.*, 2007). These parasites are numerous and many phyla in the animal kingdom have representative that are parasitic to fish. There are by far more parasite species that infect fish than any other group of infectious disease (Omeji *et al.*, 2011). The damage caused by parasites may be mechanical, causing the blockage of ducts and the compression or deformation of organs. The activities of the parasites secrete enzymes that destroy tissues, others secrete irritating substances and blood-feeding parasites may secrete anticoagulants (Marshall, 2011). Kayis *et al.*, (2009) stated that fish parasites result in huge economic losses as they increase mortality; increase farm inputs via increased treatment expenses and cause reduction in growth rate and possibly weight loss during and after the period of parasitic disease outbreak. All these militate against expansion of aquaculture. Most fish in the wild are likely to be infested with parasites, but in the great majority of cases, no significant harm to the host may be ensued or identified. Thus, there are only few reports of parasites causing mortality or serious damage to the fish populations, this may be largely because such effects go unnoticed (Roberts, 2001). Consumption of raw/ or undercooked fish by humans may as well increase the chances of parasitic zoonoses. Therefore, Consumers should take common precautions including obtaining sea food from reputable sources especially if the sea food is to be consumed uncooked. Adequate cooking is the safest way to preventing related infections to human (Butt, *et al.*, 2004). Forewarned is definitely fore-armed (Eliason, 2002). Hence, this paper is aimed at identifying the parasites of *Heterotis niloticus* from the lower River Benue and to provide information on the degree of infestation of these parasites, their site preference in relation to the body size, sex and organs infected.

MATERIALS AND METHODS

Study Area

This study took place in Makurdi, the capital of Benue state, which lies within the Lower River Benue trough in the middle belt region of Nigeria. Its geographic coordinates are longitude 7o47' and 10o0' East. Latitude 6o25' and 8o8' North, and shares boundaries with five other states namely;

Nassarawa, Taraba, Cross-River, Enugu, Kogi to the North, East, South, South-West and West respectively. It occupies a land mass of 32, 518 square kilometers.

According to Koppens scheme of classification, Benue state lies within AW and experiences two distinct seasons. The wet season from April – October with annual rainfall of 100 – 200mm, and dry season from November – March. The temperature fluctuates between 23 – 37oC in the year .

Sample Collection

One hundred and eighty (180) samples of *Heterotis niloticus* were collected from the Wadata market, Benue state of Nigeria. The fishes were transported in batches of 20 fourth nightly in plastic containers, to the fisheries and aquaculture laboratory University of Agriculture Makurdi for analysis, which was for a period of two and half months (January – March, 2014). The total and standard lengths of each fish was measured in centimeters (cm) using measuring tape, while the weight of each fish was taken in grams (g) using weighing balances. The sexes of the fish were also determined by examination on the papillae on a sorting table. External examination and internal examination of each of the fish for both ecto and endo parasites was carried out using the technique described by Emere and Egbe, 2006.

Sample Analysis for Ecto and Endo Parasites

The gills, fins and external surfaces was examined for ecto parasites using hand lens and later the skin was scraped from operculum to the caudal peduncle using a scalpel blade. The scrapped tissue will be collected into a petri dish and 3ml of 10% Sodium Hydroxide. The skins scrapings are placed on clean and dry glass slide with one drop of 10% Sodium Hydroxide. Scrapings are macerated with scalpel or spatula and covered with the cover slip. The parasites will be examined on the slide under low power of the light binocular microscope (Chauhan and Agarwal, 2006). Saline solution will be added and stirred using a mounted pin. The solution will be placed on the light binocular microscope for examination of ecto parasites. The parasites seen was identified by making their sketches as observed on the binocular microscope and compared with the pictorial guide on fish parasites by (Pouder *et al.*, 2005).

The stomach and intestine of each of the fish was cut open for examination of endo parasite. The contents of the stomach and intestine was washed into the petri-dish containing the saline solution and observed under the binocular microscope using the techniques of (Egbe and Emere, 2006).

Data Analysis

Data were analyzed using two way statistical method (ANOVA). Chi-Square was used to determine the relationship between sex percentage parasitic infestation. Correlation matrix used for total number of parasites found on *Heterotis niloticus* as well as total number of parasites found on the body parts.

RESULTS

In this study one hundred and eighty fish samples of *Heterotisniloticus* examined, 123 were infested with parasites while 57 were not. The parasites recovered were Cestodes and Nematodes, all of which were found in the fish stomach, gill and intestine. Table 1 shows parasite load in *Heterotisniloticus*.

Distribution, Location And Percentage Number Of Parasites

Distribution, location and percentage number of parasites (Fig. 1) revealed that, of the total parasites recovered from *Heterotisniloticus*, the gills accounts for 273(33.83%), stomach 216 (26.77%) while intestine 318 (39.41%). Parasites identified were *Capillariaspp* (plate 1), *Diphyllobothrumlatum* (plate 2) and *Eustrongylidesspp* (plate 3). *Diphyllobothrumlatum* recorded the highest percentage number of parasites (50.00%) in the intestine, *Capillariaspp* (31.10%), and

Eustrongylidesspp (18.90%). In the stomach, *Eustrongylidesspp* recorded the highest percentage number of parasite (56.00%), *D. latum*(29.60%), and *Capillariaspp* (14.40%). At the gills, only *Eustrongylidesspp*(21.20%) and *Capillariaspp* (15.40%) were recorded.

Relationship Between Sex Percentage Parasite Infestations

Relationship between sex percentage parasite infestations (fig.2) revealed that (47.10%) of the infested fish were males, while (52.90%) were female.

Prevalence Of Parasites In Relation To Fish Standard Length (cm) and Weight (g)

The prevalence of parasites of *Heterotisniloticus* (Fig.3) showed that parasites were most prevalent in the length group 25-40cm with (95.42%), followed by 40.1-50cm with(2.85%), and lastly 60.1-70cm with (1.74%).

Table 1. Parasite load in *Heterotisniloticus* from River Benue.

Parasite species	Parasite load (%)	Parasite load (%)
Cestode	223	27.63
Nematode	584	72.37
Total	807	100

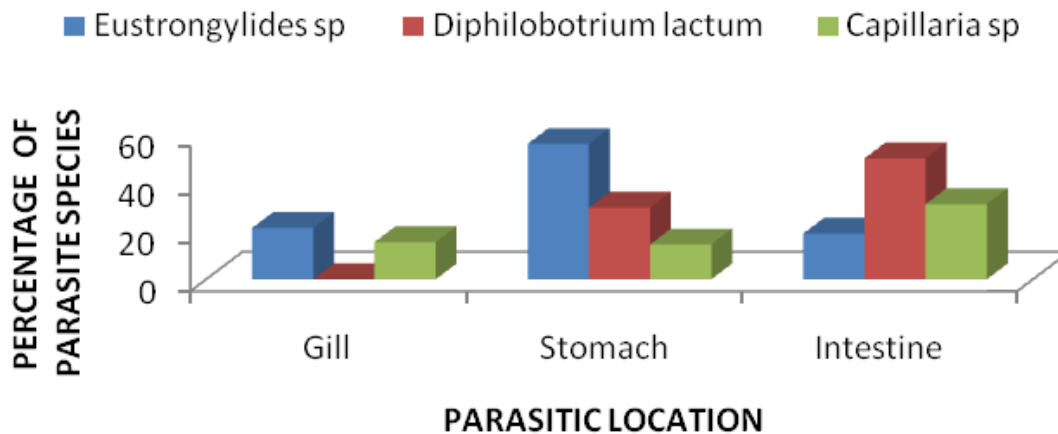


Figure 1. Parasites distribution in the gill, stomach and intestine.

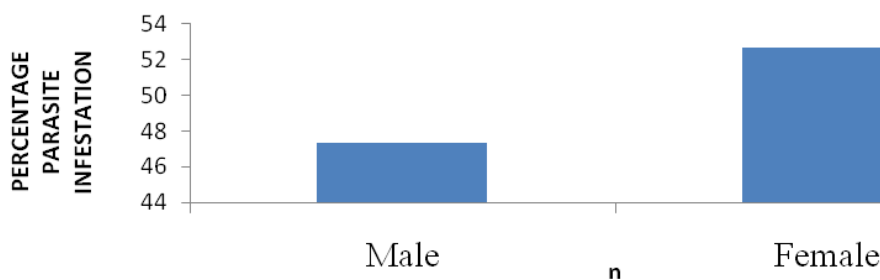


Figure 2. Parasites of *Heterotisniloticus* distribution by sex.

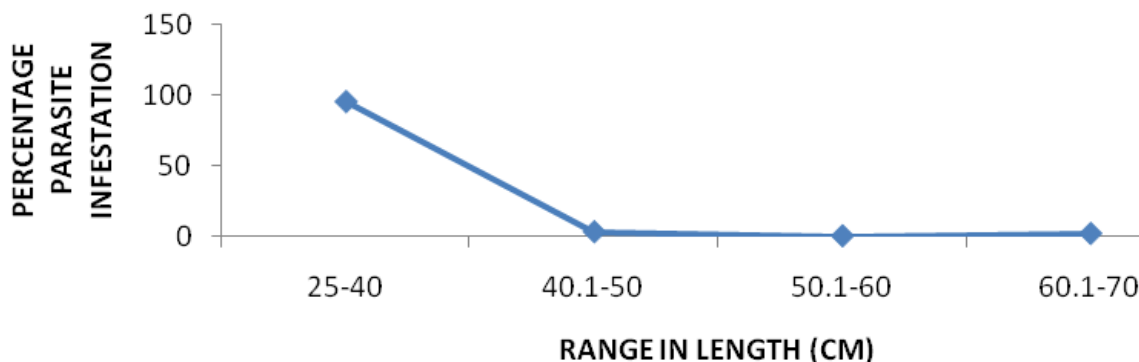


Figure 3. Relationship between length and percentage parasite infestation in *H. niloticus*.

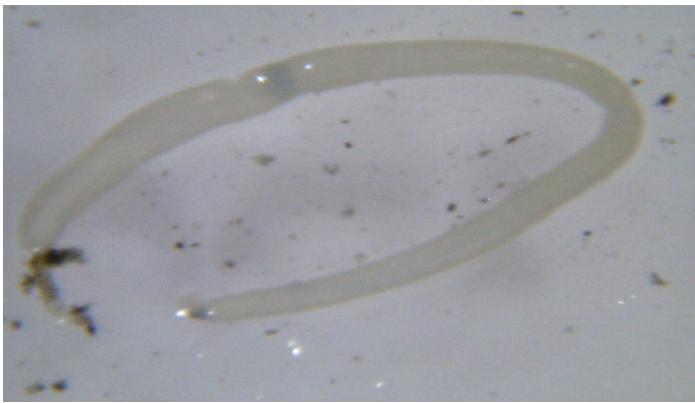
Plate 1: *Capillaria* spp found in the stomach of *Heterotis niloticus*Plate 2: *Diphyllobothrium latum* found in the stomachPlate 3: *Eustrongylides* spp found in the intestine

Figure 4: Images of plates.

From the results of the relationship between weight group and percentage parasite infestation shown in table 2, it was observed that the weight group 500-1000g recorded the highest percentage parasitic load (98.27%), 1000.1-1500g (0.00%), 1500.1-2000g (0.00%) and 2000.1-2500g (1.74%) respectively.

DISCUSSION

Result obtained from this study, revealed that cestodes and nematodes were the group of parasites observed in *Heterotis niloticus* from the Lower River Benue at Makurdi. The species of parasites includes; *Capillaria* spp, *Diphyllobothrium latum* and *Eustrongylides* spp. *Capillaria philippinensis* is a parasitic nematode which causes intestinal capillariasis (Moravec, et al., 2005). *Diphyllobothrium* has a larval stage that can be fatal to fish and infective to humans. (Margaret, et al., 2006). According to Roberts and Janovy, (2000); Kruse (2012), *Diphyllobothrium latum* is found in and around fresh water lakes and streams. The intestine among the body parts recorded the highest number of parasites, which could be associated with the fact that most digestive activities take place in the intestine resulting in the release of parasite ova/cysts in food particles. This agrees with the findings of Ekanem et al., (2011) in parasites of landed fish from great River Kwa. The smaller fishes had the highest number of parasites than the larger ones from the result obtained. This work Disagreed with Omeji, et al., (2010; 2011), who recorded higher number of parasite load on bigger fishes than smaller ones, but agreed with Nyaku et al., (2007) who worked on the relationship between fish size and number of parasite found on each species in *Oreochromis* species and *Bagrus* species and it was observed that the prevalence of the number of parasite decreases with size, and the largest number of parasites were discovered on the smaller fishes.

Female fishes were observed to have the higher percentage of parasites than the male. This might be connected to the physiological state of the females. Most gravid females could have had reduced resistance to infection by parasites. In addition, their increased rate of food intake to meet their food requirements for the development of their egg might have exposed them to more contact with the parasites, which subsequently increased their chance of being infected (Omeji, et al., 2011; Emere and Egbe, 2006) made similar observation.

Most fish especially in the wild are infested with parasites, but no significant harm to host was identified. However, there are few reports of parasites causing mortality or serious damage to fish population. Parasites in the wild fish are usually only remarked upon when they are so obvious as to lead to rejection of fish by fishermen or consumers. Man can also be infected at the cause of consumption of diseased or infected fish. Therefore, proper handling and adequate cooking of seafood are suggested ways to preventing related human infections.

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REFERENCES

- Bhatia, B. B, Pathak K.M.L and Banerjee, D.P. (2010). Textbook of Veterinary Parasitology, India, New Delhi, Kalyani Printings.
- Butt, A.A, Aldridge, K.E. and Sanders, C.V. (2004). Infection related to the Ingestion of Seafood. Part II. Parasitic infection and Food Safety. *Lancet Infection Dis.* 4(5):294-300.
- Chauhan, R.S and Agarwal, D.K., (2006) Textbook of Veterinary Clinical and Laboratory Diagnosis. India, Jaypee Brothers Medical Publishers (P) Ltd 2nd Ed.
- Elieson M. (2013). Agios pharmaceuticals to present at the Jefferies Global Conference. <http://darkimperium.crniplamen.net/audio.html>
- Emere, M. C. and Egbe, N. E. L. (2006). protozoan parasites of synodontiscariars (A fresh water fish) *Best Journal* 3(3):58-64.
- Gaonkar, R. R. (2008). Fish management, India, New Delhi, A. P. H. Publishing Corporation
- Kaur, P. Shivastav, R. Qureshi T. A. (2013). Pathological effects of *Eustrongylides* sp. Larvae (Dioctophymatidae) infection in fresh water fish, *Glossogobius giuris* (Ham.) with special reference to ovaries: *Journal of parasitic Disease*, 37, 245-250.
- Kruse, D. and Herhilian (2012). *Diphyllobothrium latum*: Animal Diversity Web: University of Michigan-Ann Arbor.
- Margaret, A. Wissman, D. V. M., D.A.B. V.P. (2006). Exotic pet Vet. Net www.exoticpetvet.net.
- Marshall, B. (2011). The fishery of Zimbabwe and their Biology. South Africa. Paarl media, Paarl, South Africa.
- Moravec, F. Scholz, T. Mendoza, E. (1995). *Capillaria (Hepatocapillaria) Cichlasomae* (Nematoda: Capillaria) from the liver of the cichlid fish *Cichlasoma aurorophthalmus*, Yucatan, Mexico. *Folia Parasitol (Praha)*, 42(1):65-8.
- Mu.G.(2014). Changes In The Quality And Yield Of Fish Fillets Due Temperature Fluctuations During Processing. United Nations University Training Programme, Iceland <http://www.unuftp.is/static/fellows/document/mugang/3prf.pdf>.
- Nyaku, R. E, Okayi, R. G, Kolndadacha, O. D, and Abdulrahman, M. (2007). A Survey Of Ectoparasites Associated With 3 Species Of Fish *Auchenoglanis occidentalis*, *Oreochromis niloticus* And *Bagrus Bayad*, In River Benue, Makurdi, Benue State, Nigeria: 2007 FISON Conference Preceeding
- Olorunfemi M. F., Olagbaju A. R., Umanah J. T., Oyelakin M. O., Awoite T. M., Sanu F. T., Ikotun I. O., Olawuyi J., and Odebode A. C., (2014). Quality Assessment Of Processed And Packaged Garnished *Clarias gariepinus* And *Archachatina marginata* (Swainson) S nacks. *International journal of Advance Agricultural Research*, 2, 41-47.
- Omeji, S, S.G. Solomon and R.A. Obande (2010). A Comparative Study of the Common Protozoan Parasites of Heterobranchius longifilis from the Wild and Cultured Environments in Benue State. *Pakistan Journal of Nutrition* 9 (9): 865-872.
- Omeji, S, Solomon, S. G, and Idoga E. S, (2011). A Comparative Study Of The Common Protozoan Parasites Of *Clarias gariepinus* From The Wild And Cultured Environments In Benue State, Nigeria: *Journal Of Parasitology Research*. [doi.org/10.1155/2011/916489](http://dx.doi.org/10.1155/2011/916489)
- Pandey, B. N. (2011). Fish Research, Vision for 21st Century, India, APH Publishing Corporation.
- Parasites/Food Safety.gov.USA, (2012). www.foodsafety.gov/..badbugbook.htm
- Pouder, B. D, Curtis, E.W, Yanong, R.P.E., (2005). Common Fresh water Parasites Pictorial Guide Edis (online) <http://edis.ifas.ufl.edu>.
- Poulin, R. (1992). Toxic pollution and Parasitism in Fresh Water. *Fish Parasitology Today* 8:51-61.
- Roberts, L. Janovy, J. (2000). Foundation of Parasitology, sixth edition. USA McGraw- Hill companies, inc..
- Roberts, R.J. (2001). Fish Pathology; Parasitology of Teleosts (Robert R. L.) (online). <http://www.afip.org/vetpath/POLA/99/Diseasesoffish.htm>.

