Original Article

Field of Study

Body Sites Preference in *Clinostomumtilapiae* Infections of *Oreochromisniloticus*

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ABSTRACT [ENGLISH/ANGLAIS]

A total of 540 specimens of *Oreochromis niloticus* with *Clinostomum tilapiae infection* were collected from 20 selected fish farms through a survey of *Clinostomum tilapiae* prevalence in Oyo State fish farms. The fishsamples were collected based on accepted sample size of 27 fish samples per fish farm assuming a 10% prevalence rate at 95% confidence interval. Live fish samples were examined paying special attention to the operculum, eye,sockets, mouth region, pharyngeal region and gills.The observation was further studied to determine whether the Trematode hadsite preference for infection.*Clinostomum tilapiae* recovered were counted according to site of infection per fish specimen. Rate of infection on each organ and parasite burden were thus determined. It was discovered that parasite burden was highest in the body cavity (8.6) and lowest in the eye socket, while the rate of parasitic infection on the skin was the highest at 19%. The rate of infection was highest in the skin and lowest in the eye socket. Rate of infection on the Operculae was 9.01%, Gills 6.29%, Body cavity 3.52%, Base of head 3.33% while pharyngeal region and eye socket had 1.11% respectively.Infections on other organs were rare but could be pathologic. The skin and the body cavity were the most affected organs in terms of rate of infection and parasite burden.

Keywords: Body sites, *Oreochromis niloticus*,infection, trematode, *Clinostomum tilapiae*

RÉSUMÉ [FRANÇAIS/FRENCH]

Un total de 540 spécimens de Oreochromis niloticus avec Clinostomum tilapiae infection ont été collectées auprès de 20 fermes piscicoles à travers sélectionnés une enquête de prévalence dans les élevages de tilapiae Clinostomum Oyo poissons de l'Etat. Les fishsamples ont été recueillies sur la base de taille de l'échantillon accepté de 27 échantillons de poissons par la pisciculture en supposant un taux de prévalence de 10% à un intervalle de confiance de 95%. Des échantillons de poissons vivants ont été examinés avec une attention particulière à l'opercule, les yeux, les sockets, région de la bouche, du pharynx et de l'observation région gills.The a en outre été étudiées afin de déterminer si la préférence pour les hadsite Trématode infection.Clinostomum tilapiae récupéré ont été comptés selon le site de l'infection par spécimen de poisson. Taux d'infection sur chaque organe et la charge parasitaire ont été ainsi déterminées. On a découvert que la charge parasitaire était plus élevé dans la cavité du corps (8,6) et la plus faible dans l'orbite, tandis que le taux d'infection parasitaire sur la peau était la plus élevée à 19%. Le taux d'infection était plus élevé dans la peau et le plus faible dans l'orbite. Taux d'infection sur le opercules était de 9,01%, 6,29% Gills, la cavité du corps 3,52%, base de la tête 3,33% tandis que la région du pharynx et orbite de l'œil avait respectively.Infections 1,11% sur d'autres organes ont été rares, mais pourrait être pathologique. La peau et la cavité du corps étaient les organes les plus touchés en termes de taux d'infection et de la charge parasitaire.

Mots-clés: Des sites du corps, Oreochromis niloticus, infection, trématodes, Clinostomum tilapiae

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INTRODUCTION

Fish rearing whether intensively or extensively is susceptible to infection due possibly to inadequate managerial efficiency especially unhygienic practices.Fish products to be presented for sale must attain a certain quality and standard, because consumers dictate low prices and high quality, hence wholesomeness of animal products is of great concern to producers. While farming systems are designed to maximize production, proper care and good husbandry practices are not only linked with high productivity, but also with animal health and wellbeing. In most systems, improved health and wellbeing translate to better animal performance. When parasitic infections are considered in fish pond culture systems, helminthes population may actually be very low, but crowded conditions that favours other diseases

and parasitic organisms cano lead to epizootics by helminthes. Meanwhile, the relative ease of culturing Tilapia and its prolificacy under tropical climate favours wide spread distribution and overcrowding. Moreover, Tilapia has been cultured among other fish species, and has enjoyed varied research outcomes. .Occurrence of Trematodes on Tilapia has been reported over time by several authors[1,2,3,4,5].Parasites may develop preference for a particular site in the host body, if it gets its nutrients and other physiological requirements conveniently at such sites[6]. *Polaeviochussp* was found active in the stomach of *Clariasangullarias* because the micro habitat was conducive[7]. *Posthodiplostomu mminmum* a trematode that seldom harms fish, was known to amass in the muscles of striped bass and body cavity of fat head minnows ([8]).*Alloglossidiumcorti* has been found in the intestines of Channel Catfish ([9]).*Diplostomumsp*and *Clonorchissp* were found on the skin , muscle and eye of fish([10]). Occurrence of *Clinostomum*sp on the skin ,muscle and eye was recorded by,Balarin and HattonXyz([3])from Ghana water bodies on *Sarotherodon melanotheron, S. galileus; Tilapia zilli and S. niloticus*. Digenetic trematodes have epidemiological characteristics in common; they are found encysted in various intermediate hosts, and have been found to infect man and domestic animals.

This study is presenting possibilities of site preference of infection in the trematode *Clinostomum tilapiae*.The prevalence in Oyo State fish farms was determined to be 80%[11] hence the further study on the site preference of the trematode which could be a lead-way into the prevention and possible mode of control

MATERIALS AND METHODS

Atotal of 540 specimens of *Oreochromis niloticus* infectedwith*Clinostomum tilapiae* were collected from 20 selected fish farms located within Oyo State. Nigeria.Oyo State is located at Latitude 7^{0}N and9^{0}15'N and Longitude 2^{0}3'Eand4^{0}15'E.The sample of 27 specimen per fish farm was based on the calculation of Ossiander and Wedemeyer([12]).This was dependent on the fish population on each farm which ranged between 1500-12,000 and assuming a 10% prevalence rate at 95% confidence interval (i.e. $p<0.05$).Live fish samples were examined paying special attention to the operculum, eye,sockets, mouth region ,pharyngeal region and gills. Forceps was used to gently remove the stages of parasite found on these sites, after which the fishes were demobilized by pitching and dissected to examine the viscera and the body cavity. *Clinostomum tilapiae* recovered were counted according to sites of infection per fish specimen. Rate of infection on each organ and parasite burden were thus determined using the indices of Margolis, et al [13]

RESULTS

The result in Table 1 showed that parasite burden was highest in the body cavity(8.6) and lowest in the eye socket(1.33). The rate of infection was highest in the skin and lowest in the eye socket. The rate of infection on the operculae was 9.01%, it was 6.29% on the gills, on the body cavity it was 3.52% while it was 3.33% on the base of the head, on the pharyngeal region it was 1.11% and also 1.11% on the eye socket. In this study both the metacercariae and the adults stages of the trematode were found, the adults were observed mostly in the body cavity as shown in plate 1 and the metacercariae were observed on the skin as shown in plate 2.The rate of infection per organ in relation to parasite burden exhibited by each organ is described with histogram in Figure 1 while the pie chart in Figure 2 describes the rate of infection per organ.

DISCUSSION

The analysis from this study has shown that *Clinostomum tilapiae* infection was more infective on the skin and body cavity of *O. niloticus but* rarely observed on the eye, and, if it occurs could be pathologic. Metacercariae stage of *Clinostomum sp* occurs in tissues and organs; it differs from the adolcercariae because it encysts on the skin of the host. The cysts were produced when the skin, reacts to infection as a defensive measure, whereby parasite is walled off and prevented from making further penetration into the body[[14] .Metacercariae of trematodes target any internal or external tissue especially if fish is the intermediate host. *C.tilapiae* metacercariae may not cause any significant harm to the skin because it may likely be destroyed by cleaning and grooming activities of the host if it is a constant source of irritation.Nickum [15] explained that fish have ability to identify irritants and response to such irritants is costly to fish's energy and may eventually be costly to the producer in terms of lower production efficiency and poor survival rate. XyzHoffman[16], also observed that the presence of metacercariae on the skin of fish usually cause little harm at least in older fish, however fry or juvenile

fish may be badly affected or even killed, if exposed to heavy metacercarial invasion. This applies to any species of cercaria that penetrates the tissue, the cyst burst to release the adult stage which carefully find their entrance probably through the gills into the body cavity. Further studies on the pathogenesis and sites of infection may help in devising possible control/preventive measures in *C.tilapiae* infections of fish, for instance, mucous antibody of parasite may be active against some external infections. Meanwhile detection of parasite antigen in host body fluid has been focused towards obtaining specific antigen that would be useful as a diagnostic tool for parasitic disease [[17].Flukes may sometimes act as carriers of other disease agents as in the case of flukes carrying an agent poisonous to dogs that is contracted from infected salmon or trout[18].*Clinostomum sp* has been found in a number of tropical fish including *Chrysichthys nigrodigitatus ,Cyprinus carpio, Heterotis niloticus and Synodontis sp*[19[.It has also attracted public health importance and high intensity might cause mortalities in isolated case. In this study, *Clinostomum sp* get established around the head region adol cercaria were found moving freely in the body cavity and the pharyngeal region while only the cyst containing the metacercariae were found attached to the skin which may impair respiration of skin also reported byMoore,*et al* [8]. The parasite burden was highest in the body cavity followed by the skin and base of the headthis may mean that the parasite tends to move through the axial region to get into the body cavity suggesting the infection pathway.

The grading according to the rate of infection suggesting the infection pathway of *Clinostomum tilapiae is* as shown below:

SKIN (19)>OPERCULAE (9.01)>GILLS (6.29)> BODY CAVITY (3.52)> BASE OF HEAD(3.33)>PHARYGEALREGION (1.11)>EYE SOCKET (1.11).

While the grading according to parasite burden could also be described as shown below

BODYCAVITY(8.6)>SKIN (4.05)>PHARYNGEALREGION (3.5)>OPERCULAE (2.9)>GILLS (2.0)>BASE OF HEAD (1.6)>EYE SOCKET (1.3). This therefore suggests the pathway of infection as described in Figure 3

The presence of metacercariae on the skin of fish usually cause little harm at least in older fish except scratching body on rearing facilities which causes lesions predisposing to secondary infections. However , fry or juveniles fish may be badly affected or even killed if exposed to heavy metacercariae invasion[[16]. This applies to any species of cercariae that penetrate into fish regardless of their final site or state of maturation in host. *C. tilapiae* does not penetrate the flesh, the cyst burst to release the adult stages which carefully find their entrance probably through the gills into the body cavity as a convenient site of livelihood.Treatment by dipping and general acceptable organophosphates is recommended for fluke infection. Since skin infection has featured prominently in the pathway of infection and this is external, proper liming, desiltation and disinfection of fish ponds is very important in combating the infection

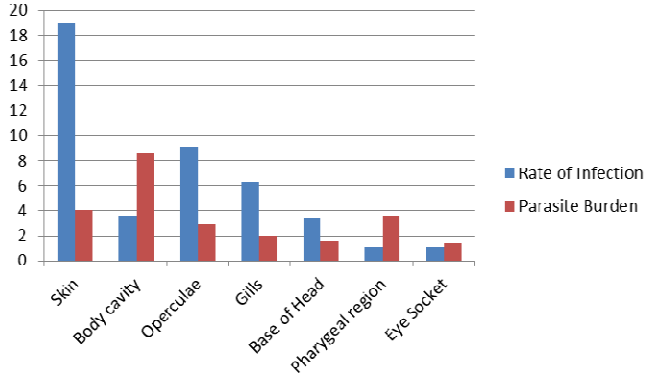
TABLE 1: This table shows analysis of Site preference infection in *C.tilapiae*

S/N	Body sites(a)	No of Fish Examined(b)	No of Fish Infected (c)	Rate of Infection(d) = c\b x *100*	No of *C. tilapiae* Found(e)	Average Parasite Burden(f) = e\c
1.	Skin	540	104	19	421	4.05
2.	Body Cavity	540	19	3.52	181	8.6
3.	Operculae	540	49	9.01	144	2.9
4.	Gills	540	34	6.29	68	2.0
5.	Base of Head	540	18	3.33	39	1.61
6.	Pharyngeal Region	540	6	1.11	21	3.5
7.	Eye socket	540	6	1.11	8	1.33

Plate 1: This plate shows *Clinostomumtilapiae* infection in the Body cavity

Plate 2: This plate shows *Clinostomum tilapiae infection* on the skin of *Oreochromis niloticu*

Figure 1: This figure shows rate of infection in relation to Parasite Burden



CONCLUSION

It is concluded that this study found that *Clinostomum tilapiae* prefers to habit either the skin or the body cavity *of Oreochromis niloticus*.The study shows the infection pathway from skin to the body cavity through the pharyngeal region and the gills. This is to show that treatment of the trematode should start at the environment level before it gets to systemic treatment. It can also be concluded that Clinostomum sp infection in fish can be handled during processing by descaling, degutting and paying special attention to the gills and pharyngeal region. This is to prevent human infection through consumption of such infected fish as Lewis[20] commented ''Almost all fish are safe to eat when thoroughly cooked,smoked or frozen

Figure 2: This figure shows rate of infection according to organ

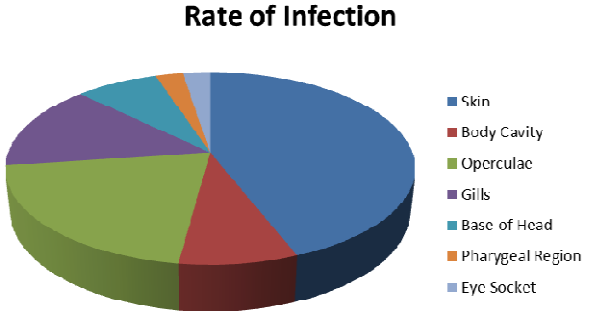
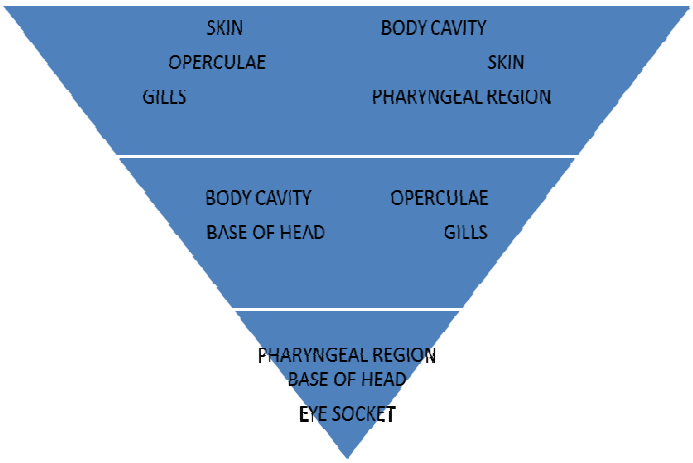


Figure 3: This figure shows graphical illustration of the pathway of infection of *Clinostomum sp*. in *O. niloticus* organs



RECOMMENDATION

Although the infection of *C. tilapiae* may vb not have grown into an epidemic, still research on its pathological pathway and mode of treatment should be encouraged to help fish farmers, fishers and processors. A health management program that focuses on both infectious and non-infectious diseases is suggested to be put in place for individual aquaculture species.

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CONFLICT OF INTEREST

No conflict of interests was declared by authors

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