



Association for Aquatic Sciences of Nigeria (ISSN: 0189-8779)
<http://www.journalofaquaticsciences>

Journal of Aquatic Sciences, 33: 9-16 (2018) DOI: <https://dx.doi.org/10.4314.jas.v33i1.2>

INCIDENCE OF *Trichodina heterodontata* IN *Clarias gariepinus* FROM TWO FISH FARMS IN CALABAR, CROSS RIVER STATE, NIGERIA

¹V. O. EYO, ²U. J. XAVIER AND ³B. E. UDOBONG

¹Department of Fisheries and Aquaculture, Faculty of Marine Environmental Management, Nigeria Maritime University, Okerenkoko, Delta State, Nigeria

²Department of Fisheries and Aquaculture, Faculty of Agriculture, Usmanu Danfodio University, Sokoto, Sokoto State, Nigeria

³Fisheries and Aquaculture Programme, Department of Zoology and Environmental Biology, Faculty of Biological Science, University of Calabar, P.M.B. 1115, Calabar, Cross River State, Nigeria

Corresponding Author's email: sirvick2003@yahoo.com Phone number: +2348065162221

ABSTRACT

The study was conducted to determine the prevalence, mean intensity, and abundance of *Trichodina heterodontata* in *Clarias gariepinus* from two selected fish farms in Calabar.. A total of eighty (80) samples of *C. gariepinus* from the two farms (40 each) were necropsied for parasitological analysis. Gill, skin and fin biopsies were prepared from each specimen following standard methods. Parasitological indices including prevalence, mean intensity and abundance were calculated according to standard formulae. Results obtained showed that 18 fish samples were infested with *T. heterodontata* from the two farms with a total of 84 *T. heterodontata* parasites. In farm 1, prevalence (20.0), intensity (4.50) and abundance (0.90) of *Trichodina* parasite was lower than farm 2 with prevalence (25.0), intensity (4.80) and abundance (1.20). In both farms, prevalence, intensity and abundance of *T. heterodontata* were higher in female *C. gariepinus* than male but not significant ($p>0.05$). Clinical signs observed in the two farms were loss of appetite, necrosis and skin ulcer, sluggish movement and excessive secretion from the gills. *Trichodina* infestation in farmed fish may lead to poor growth rates and high mortality which will subsequently result in huge monetary loss and low profit margin by increasing production cost due to the cost of treatments. It is therefore concluded that ponds or tanks should be properly disinfected before stocking of healthy fingerlings.

Keywords: Prevalence, Intensity, Abundance, *Trichodina heterodontata*, *Clarias gariepinus*

Incidence of *Trichodina heterodontata* in *Clarias gariepinus* from two Fish Farms in Calabar, Cross River State, Nigeria

INTRODUCTION

Trichodinids are among one of the most common ectoparasites in farmed and wild fish (Basson and Van-As, 1994; Martins and Ghiraldelli, 2008). They are ciliated protozoan which are able to invade their hosts within a short period because of their direct transmission mode, especially when fish are exposed to sub-optimal conditions (Lom, 1995). They normally occur in a few numbers on mucous surface and gills. In aquatic ecosystems, trichodinids may proliferate when the relationship between host, parasite and environment is broken by factors such as poor water quality, nutritional deficiency, infectious and parasitic diseases. This leads to visible and severe epidermal lesions and disease outbreaks (Madsen *et al.*, 2000; Martins *et al.*, 2002; Khan, 2004 and Huh *et al.*, 2005). Other clinical signs associated with trichodinids proliferation include loss of appetite, sluggish movement and excessive mucus secretion from the skin and gills. According to Tumbol *et al.*, (2001) and Eyo *et al.*, (2015), outbreak of parasitic diseases can also result in a pathway for secondary pathogens such as bacteria, fungi and viruses to invade the host. Globally, about 300 nominal *Trichodina* species have been documented (Tang and Zhao, 2011; 2012) with many species exhibiting morphological variability and low host specificity which make their identification difficult (Lom and Dykova, 1992). The taxonomy of Trichodinids is based on the appearance and structure of the adhesive disc and number and size of its constituents which could only be revealed by the silver impregnation technique of Klein (Tantry *et al.*, 2016).

In Nigeria, thousands of people have embraced fish farming as a means of livelihood because of the opportunities it presents. Such opportunities are

employment, income generation and source of protein (Eyo and Ivon, 2017). Apart from these, thousands of Nigerians are consumers of fish as protein source due to its cheapness, health and nutritional benefits (Eyo *et al.*, 2014). The African catfish (*Clarias gariepinus*) which belongs to the family Clariidae is the most farmed fish species in Nigeria (Eyo *et al.*, 2014). This is attributed to several advantageous characteristics exhibited by this species. Such attributes include ability to tolerate wide range of environmental conditions, fast growth rate, high stocking densities, high disease resistance, acceptability of formulated feed, high fecundity, high food value, ease of artificial breeding and high market value (Eyo *et al.*, 2014). However, one of the major constraints limiting the growth of fish farming in Nigeria is outbreak of parasitic diseases such as trichodiniasis. This results in poor growth of fish, poor weight gain, mass mortality and huge monetary loss. Therefore, the aim of this study was to determine the prevalence, mean intensity, and abundance of *Trichodina heterodontata* in *C. gariepinus* from two selected fish farms in Calabar, Cross River State, Nigeria.

MATERIALS AND METHODS

Study Site

Samples of the African catfish, *C. gariepinus* used in this study were collected from in two private fish farms located at Calabar South Local Government Area, Cross River State of Nigeria for parasitological analysis. Both Fish farm 1 (Victor's Farm) and fish farm 2 (Timok's farm) are specialized in catfish production ranging from fingerlings production, table-size fish to broodstock production. Facilities available in the two farms are concrete tanks and tarpaulin tanks.

Incidence of *Trichodina heterodontata* in *Clarias gariepinus* from two Fish Farms in Calabar, Cross River State, Nigeria

Collection and Transportation of Fish Specimens

A total of 80 *C. gariepinus* specimens were collected from the two farms (40- from each farm) and used for this study. Specimens collected were stored in a labelled transparent rectangular plastic container with cover and transported -live to the Fish and Aquaculture Laboratory, Institute of Oceanography, University of Calabar for identification and examination. Collection of specimens was based on physical observable signs such as wounds, lesions, patches, fin rot and behavioral signs such as loss of appetite, erratic swimming and rubbing the skin against the walls of the tank (Paperna, 1996).

Clinical Examination and Parasitological Analysis

Fish specimens were collected with hand net and biometric measurement including total weight (g) and total length (cm) taken using standard equipment. Thereafter, the fish were necropsied for parasitological analysis. Before microscopic examination of the samples, the specimens were examined externally for clinical signs of parasitic infections. For each sample, fin biopsy was prepared from the dorsal and caudal fin, skin biopsy from the entire by length while gill biopsy from the second gill-arch (Roohi *et al.*, 2014). Wet mounts of all biopsied tissues were prepared for further analysis and examined under binocular microscope for *Trichodina* parasites. For identification of *Trichodina* species, samples of *Trichodina* were collected from infected fish specimen and dry smears were made and impregnated in Klein's silver nitrate solution (Lom and Dykova 1992). For parasite identification, sketches were made

given by Paperna (1996) and Pouder *et al.*, (2005).

Photomicrograph of the Parasite

After silver nitrate impregnation of the *Trichodina* parasite in a dry smear, Amcap Microscope Camera was used to capture a picture of the *Trichodina* parasite.

Calculation of Parasitological Indices

Parasitological indices evaluated in this study include prevalence (%), intensity and abundance and were calculated according to formula given by Upadhyay *et al.*, (2012) as followed:

Prevalence (%) = (No. of infected fish/Total No. of fish examined)*100

Intensity = No. of collected parasites/No. of infested fish

Abundance = No. of parasites/No. of fish examined

Measurement of Physico-chemical Parameters

Water quality parameters including dissolved oxygen, pH, temperature and ammonia were measured in the two fish farms where the fish were collected. Dissolved oxygen was measured in mg/L by using dissolved oxygen meter, pH was measured by using pH meter, water temperature was measured by using thermometer while ammonia was measured colorimetrically by using ammonia test kit.

Statistical Analysis

Results obtained for percentage prevalence, intensity and abundance of *Trichodina* parasite in *C. gariepinus* from the two farms in relation to sex were subjected to T-test Statistics for significance at $p = 0.05$ level using Predictive Analytical Software (PASW) version 18.

Incidence of *Trichodina heterodentata* in *Clarias gariepinus* from two Fish Farms in Calabar, Cross River State, Nigeria

RESULTS AND DISCUSSION

Structural Morphology of *T.*

heterodentata

The specimen of *Trichodina* parasite isolated from the examined fishes is presented in Figure 1. Findings of this study on the structural morphology of *T.*

heterodentata isolated from *C. gariepinus* from the two farms agrees with reports by Paperna (1996) and Martins *et al.*, (2010) A similar structure was reported by Tantry *et al.*, (2016) for *T. heterodentata* isolated from Cyprinid fishes collected from various fish ponds in India.

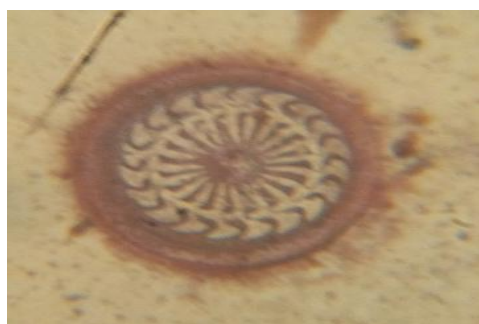


Figure 1: Specimen of *Trichodina heterodentata* isolated from infected *C. gariepinus*.

Number, Percentage, Prevalence, Intensity and Abundance of Parasites

The results obtained in this study revealed that of all the 40 specimens of *C. gariepinus* examined in farm 1, eight (8) were infested with 36 parasites, with 20% prevalence, 4.50 intensity and 0.90 parasite. In farm 2, ten (10) fish specimens were infested with 48 parasites, 25% prevalence, 4.80 parasite intensity and 1.20 abundance. However, the intensity and prevalence of *T. heterodentata* parasite recorded in the two farms may lead to the outbreak of Trichodiniasis exposing the farms to high risk of poor fish growth, fish mortalities and

subsequently monetary loss. Infected fish samples were seen with hemorrhaging fins and barbels (Figures 2). According to Mackenzie (1983), characteristics of Trichodinids include good bioindicators, easy isolation from their host, easy identification at the generic level, ability to respond quickly to changing environmental conditions and non-pathogenicity at low intensities. These characteristics strongly suggest that the intensity and prevalence of trichodinid infestations might be useful as an individual measure for evaluating the biological integrity of aquatic ecosystems (Fernandes *et al.*, 2011).

Incidence of *Trichodina heterodentata* in *Clarias gariepinus* from two Fish Farms in Calabar, Cross River State, Nigeria



Figures 2: Infected *Clarias gariepinus* with clinical signs of *Trichodina heterodentata* infections such as hemorrhage at the tips of dorsal, anal, caudal fins and barbels (arrows).

Number, Prevalence, Intensity and Abundance of Parasites in Relation to Sex

In farm 1, a total of 16 male (40%) and 24 female (60%) *C. gariepinus* were examined. Out of which 3 males were infested with 16 parasites with prevalence of 18.75 %, intensity (5.33) and abundance (1.00). In the female group, 5 samples were infested with 16 parasites with a prevalence (20.83%), intensity (4.00) and abundance (0.83). In farm 2, a total of 18 male (45 %) and 22 female (55%) *C. gariepinus* were examined. Out of, 4 males were infested with 17 parasites with prevalence of 22.22 %, intensity (4.25) and abundance (0.94). Six female samples were infested with 29 parasites with a prevalence (24.00 %), intensity (4.83) and abundance (1.32). Results revealed that prevalence, intensity and abundance of *Trichodina* parasite were higher in female fish than males. This agreed with the reports of Eyo *et al.*, (2015)

who worked on monogenean parasites of *C. gariepinus* from private fish farms in Calabar, Cross River State. Similar observations were documented by Alam *et al.* (2010) for *Channa punctatus* collected from hatchery and sewage lagoon and Eyo and Effanga (2018) for *Synodontis schall* from Cross River Estuary. According to Alam *et al.*, (2010), the cause of higher parasite intensity in female fishes than male could be attributed to ecological habitat and sex hormones. In the opinion of Aloo *et al.*, (2004), the main reason for the variation in parasitic infestation in relation to sex was physiological.

Physicochemical Parameters of the two Farms

Results of physicochemical parameters in the two farms (Table 1) were still within recommended levels for the culture of freshwater fishes

Incidence of *Trichodina heterodontata* in *Clarias gariepinus* from two Fish Farms in Calabar, Cross River State, Nigeria

Table 1: Physicochemical parameters of the two farms

Parameters	Farm 1	Farm 2
pH	6.8 – 7.1	6.9 – 7.2
Water temperature (°C)	28.0 – 29.0	28.0 – 29.0
Dissolved oxygen (mg/L)	3.5 – 3.8	3.3 – 3.7
Ammonia (mg/L)	0.00 – 0.005	0.00 – 0.004

Conclusion

Trichodina infestation in farmed fish may lead to poor growth rates and high mortality which will subsequently result in huge monetary loss and low profit margin by increasing production cost due to the cost of treatments. It is therefore concluded that culture ponds or tanks should be properly disinfected before stocking of healthy fingerlings. Also, water quality should be maintained at optimal and recommended levels to avoid pre-disposing fish to parasite infestation.

REFERENCE

- Alam, M. J., Rakibuzzaman, M. & Hasan, M. M. (2010). Comparative study of endoparasitic infestation in *Channa punctatus* (Bloch, 1793) collected from hatchery and sewage lagoon. *Nat Sci*, 8(5): 52-6.
- Aloo, P. A., Anam, R. O. & Mwangi, J. N. (2004). Metazoan parasites of some commercially important fish along the Kenyan Coast. *West Indian Ocean J Mar Sci.*, 3(1): 71-8.
- Basson, L. & Van As, J. G. (1994). Trichodinid ectoparasites (Ciliophora: Peritrichida) of wild and cultured freshwater fishes in Taiwan, with notes on their origin. *Systematic Parasitology*, 28(3): 197-222.
- Effanga, E. O. & Eyo, V. O. (2018). Endoparasitic Infestation of the Nile Squeaker, *Synodontis schall* (Bloch and Schneider, 1801) from the Cross River Estuary, Nigeria. *Asian Journal of Advances in Agricultural Research*, 6(3): 1-10.
- Eyo, V. O. & Effanga, E. O. (2018). Ectoparasitic infestation of the Nile Squeaker, *Synodontis schall* (Bloch and Schneider, 1801) from the Cross River Estuary, Nigeria. *Int. J. Aquat. Biol.* (2018) 6(1): 37-43
- Eyo, V. O. & Ivon, E. A. (2017). Growth performance, survival and feed utilization of the African Catfish *Heterobranchus longifilis* (Valenciennes, 1840) fed diets with varying inclusion levels of *Moringa oleifera* leaf meal (MLM). *Asian Journal of Biology*, 4(1): 1 – 10.
- Eyo, V. O., Ekanem, A. P. & Jimmy, U. U. (2014). A comparative study of the gonado-somatic index (GSI) and gonad gross morphology of African catfish (*Clarias gariepinus*) fed Unical aqua feed and Coppens commercial feed. *Croatian Journal of Fisheries*, 72: 63 – 69.
- Eyo V.O., Edet T.A. & Ekanem A.P. (2015). Monogenean parasites of the African catfish *Clarias gariepinus* cultured in Calabar, Cross River State Nigeria. *Journal of Coastal Life Medicine*, 3(6): 930-934.
- Eyo, V. O., Ekanem, A. P., Eni, G. E., Asikpo, P. E., Ufon-Ima, J. U. (2013). Comparative study of growth performance, food utilisation and survival of hatchery bred and wild collected fingerlings of African

Incidence of *Trichodina heterodentata* in *Clarias gariepinus* from two Fish Farms in Calabar, Cross River State, Nigeria

- catfish *Clarias gariepinus*. *Greener J Oceanogr Mar Sci*, 1(1): 1-10.
- Fernandes, N. M., Sartini, B., Dias, R. J. P. & D'Agosto, M. (2011). Quantitative study of *Trichodina heterodentata* (Ciliophora: Mobilia) infrapopulations infesting tadpoles of a Brazilian endemic toad *Rhinella pombali* (Anura: Bufonidae). *Zoologia*, 28 (6): 777–783.
- Huh, M. D., Thomas, C. D., Udomkusonsri, P. & Noga, E. J. (2005). Epidemic trichodinosis associated with sever epidermal hyperplasia in largemouth bass, *Micropterus salmoides* from North Carolina, USA. *Journal of Wildlife Diseases*, 41(3): 647-653.
- Khan, R. A. (2004). Disease outbreaks and mass mortality in cultured Atlantic cod, *Gadus morrhua* L., associated with *Trichodina murmanica* (Ciliophora). *Journal of Fish Diseases*, 27(3): 181-184.
- Lom, J. (1995). Trichodinidae and other ciliates (Phylum Ciliophora), p. 229-262. In : P.T.K. WOO (Ed.). *Fish Diseases and Disorders: Protozoan and Metazoan Infections*. Wallingford, CAB International, X+ 808p.
- Lom, J. & Dyková, I. (1992) *Protozoan parasites of fishes*. Elsevier, Amsterdam.
- Mackenzie, K. (1983). Parasites as biological tags in fish populations studies. *Advances in Applied Biology*, 7 (1): 251-331.
- Madsen, H. C. K., Buchmann, K. & Møllergaard, S. (2000). *Trichodina* sp. (Ciliophora: Peritrichida) in Eel *Anguilla anguilla* in recirculation systems in Denmark: host-parasite relations. *Disease of Aquatic Organisms*, 42(2): 149-152.
- Martins, M. L. & Ghiraldelli, L. (2008). *Trichodina magna* Van As and Basson, 1989 (Ciliophora: Peritrichia) from cultured Nile tilapia in the State of Santa Catarina, Brazil. *Brazilian Journal of Biology*, 68(1): 169-172.
- Martins, M. L., Archiori, N. M., Unes, G. N. & Odrigues, M.P. R. (2010). First record of *Trichodina heterodentata* (Ciliophora: Trichodinidae) from channel catfish, *Ictalurus punctatus* cultivated in Brazil. *Brazilian Journal of Biology*, 70(3): 637-644
- Martins, M. L., Onaka, E. M., Moraes, F. R., Bozzo, F. R., Paiva, A. M. & Gonçalves, A. (2002). Recent studies on parasitic infections of freshwater cultivated fish in the State of São Paulo, Brazil. *Acta Scientiarum Biological Sciences*, 24(4): 981-985.
- Paperna I. (1996). *Parasites infections and disease of fishes in Africa- an update*. Rome: Food and Agriculture Organization. CIFA Technical paper No. 31.
- Poudel, R. D. B., Curtis, E. W. & Yanong, R. P. E. (2005). *Common freshwater parasite pictorial guide* edis
- Roohi, J. D., Sattari, M., Asgharnia, M. & Rufchaei, R. (2014). Occurrence and intensity of parasites in European catfish, *Silurus glanis* L., 1758 from the Anzali wetland, southwest of the Caspian Sea, Iran. *Croatian Journal of Fisheries*, 72(1): 25-31.
- Tang, F. H. & Zhao, Y. J. (2011). Study of trichodinids (Protozoa, Ciliophora) parasitic on gills of freshwater fishes from Chongqing, China, and identification of a new species, *Trichodina cyprinocola* sp. nov. *Afr J Microbiol Res* 5(26):5523–5527
- Tang, F. H. & Zhao, Y. J. (2012) Two trichodinids of Paratrachodina (Ciliophora, Peritrichida, Trichodinidae) infecting gills of *Ictalurus punctatus* from Chongqing,

Incidence of *Trichodina heterodontata* in *Clarias gariepinus* from two Fish Farms in Calabar, Cross River State, Nigeria

- China. Afr J Microbiol Res 6(9):2145–2149.
- Tantry, T. A., Nazir, R., Chishti, M. Z., Ahmad, F., Dar, G. H. & Dar, J. S. (2016). A report on the incidence of *Trichodina heterodontata* from fishes of Jammu, J&K India. J. Parasit Dis., 40(2): 524–527.
- Tumbol, R. A., Powell, M. D. & Nowak, B. F. (2001). Ionic effect of infection of *Ichthyophthirius multifiliis* in goldfish. *J Aquat Anim Health*, 13(1): 20-6.
- Upadhyay, J., Jauhari, R.K. & Pemola Devi, N. (2012). Parasitic incidence in a cyprinid fish *Labeo rohita* (Ham.) at river Song in Doon valley (Uttarakhand). *J Parasit Dis*, 36(1): 56-60.
- Received:** 9th August, 2018; **Accepted:** 20th October, 2018.