

Medically Important Parasites of *Clarias Gariepinus* (Catfish) in Nigeria



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Abstract

Parasites of *Clarias gariepinus* is of medical importance which affects economic value of fish produced and raised public health concern in the different geopolitical zones in Nigeria. *C. gariepinus* examined for both endo and ecto parasites respectively in several review work shows different parasites belonging to different groups. These include cestode, nematode, trematodes and Protozoan. Trematodes are among the major parasites found affecting *C. gariepinus*, it damages the muscles of fish making it disgusting and unmarketable. In human flatworm causes a condition called Trematodosis. Fish roundworms (Nematodes) causes a condition in human called Aniskiasis. Fish tapeworms(cestodes) causes a condition in human called Diphyllbothriasis. *C. gariepinus* has shown high parasitemia of both medical and economic concern, its high level of endoparasites and ectoparasite may result in adverse conditions either to the aquatic system or to animals (human inclusive) who consumer this species of fish..

Keywords: *Clarias gariepinus*, Medical important; Parasites; Docosaheptaenoic acid; Eicosapentaenoic acid; *Ichthyophthirius multifiliis*; *Trichodina* spp; monogeneans; Animals; *Pseudoterranova decipiens*

Introduction

Fish is a cheap and important source of protein which also contains calcium, lipids, minerals, vitamins and oils with desirably low cholesterol levels in the diets of fish lovers. Economically, it is a source of income and it has continued to be the most affordable source of animal protein to an average Nigerian family [1]. The byproduct of fish can be incorporated into feeds of livestock and poultry. Fish accounts for more than 40% of the protein diet of two-thirds of the global population. Fish interacts with the various levels of food chain and influence the structures of lakes, streams and estuaries since they are usually restricted to particular modes of life related to their food sources and reproductive requirements [2].

The African catfish *Clarias gariepinus* belonging to the family *Claridae* is the most popular fish food which is considered to be one of the most important tropical fish for aquaculture in Nigeria [3]. It is very common in swamps lakes and rivers throughout Africa and it is the main fish fisherman catches. *C. gariepinus* hold great promise in fish farming in Africa due to its wide geographical spread, high growth rate and it resistant to stress. It is well appreciated, highly priced and requested for by both fish farmers and consumers in Nigeria in either smoked or fresh form. It is

found throughout Africa, Nigeria inclusive and live in freshwater and human-made habitat, such as the earthen pond or concrete ponds. The fish was introduced all over the world in the early 1980's for aquaculture purposes [3].

Cited that in many parts of Nigeria, consumption of catfish has been regarded as part of exclusive delicacies for the upper class, although the cost is within the rich of the majority. Catfish is one of the major sources of omega-3 fatty acid, which is very important nutrient that protect the body against some of the most common deadly non communicable diseases especially cardio-vascular disease, Omega-3 fatty acid consist of Docosaheptaenoic Acid(DHA) and Eicosapentaenoic acid (EPA), which are essential fatty acid that need to be supplied regularly in human diet. His work on retrospective and descriptive cross-sectional survey among 259 consenting respondent and 50 catfish farmers reflected the level of acceptability of consumption of catfish [4].

Physiology and morphology of medical important fish parasite

In his work, on Parasitic Protozoan isolated *Ichthyophthirius multifiliis* from skin and gills of infested *C.gariepinus*. The Parasite

is the largest known parasitic protozoan found on fishes. Adult organisms are oval to round and measure 0.5 to 1.0 mm in size. The adult is uniformly ciliated and contains a horseshoe-shaped nucleus which can be seen in older individuals. *Trichodina spp.* is isolated from skin, fins and gills of infested *C. gariepinus*. This parasite is large with disc shaped body. The adhesive disc is saucer shaped. The parasite is provided with several rows of cilia at the circular periphery and the inner circle of toothed denticles. The macronucleus is horseshoe-shaped, and micronucleus is small and difficult to be seen in some specimens. *Epistylis spp.* is isolated from skin and gills of infested catfish. It is a sessile contractile ciliate. Stalk is long and noncontractile. Often forms a branched colony. The distal end of the organism is surrounded by rapidly moving cilia which appear as a blur. The monogenetic *Gyrodactylus* is detected in gills and skin of infested *C. gariepinus*. It is flat worm with one pair of projection at its anterior pole. It can be distinguished from other *monogeneans* by the absence of eye spots and the occurrence of the embryos in the mid-region of the body (Viviparous *monogenean*). Posterior end has the organ of fixation, opisthaptor, which is guarded with a number of marginal hooklets and a central one pair of hooks.

Zoonotic fish parasite

The ability of fish especially freshwater fish like *Clarias gariepinus* transmit parasite to human and animals is well recognized [5]. Mentioned that some parasite of fishes is zoonotic while they are also capable of serving as intermediate host or definitive host of parasites that may be harmful to man or other animals. The occurrence of this medically important parasites in *C. gariepinus* varies considerably from one geographical region to another and amongst fish farm. The protozoans and helminths are reported to be the major group of parasites of fish (including *Clarias gariepinus*) involved in parasitism in Nigeria. Endoparasite reduced fish availability for consumption and also increased the danger of fish parasites occurring in our food, which serve as a threat to human health. Parasites usually exist in equilibrium with their host as a survival strategy [6,7]. reported that a moderate number of nematodes, *trematodes*, *cestodes* and *acanthocephalans* infest humans, but held that only a few cause serious diseases. According to him, the most important of the helminths acquired by humans from fish are the anisakis nematodes (particularly *A. simplex* and *Pseudoterranova decipiens*), *cestodes* of the families Heterophylidae, *Opisthorchilidae* and *Nanophyetidae* [8]. Studied the risk of infection with fish-borne parasites and mention that they present a potential threat to the health of human consumers. Parasites like tapeworm species that occur in fish can infect people and other fish-eating mammals, if they swallow living larvae by ingesting raw meat or insufficiently cooked meat as in roasted beef. As a result of this, an understanding of endoparasites in the wild (River Gudi) is essentially in order to find ways of avoiding zoonosis and excess loss if intensive aquaculture disease expected under intensive aquaculture.

Medical importance of fish parasite

In recent time, medically important parasite present in fishes have been source of concern to both medical practitioners and veterinarians. Parasitic infections are some of the factors hindering high fish productivity in fish farming [6]. In many parts of the world, there exists a wide body of knowledge on fish parasites and diseases as evidenced by enormous amount of literature and information available. Parasites are one of the most diverse and common pathogens the agriculturist may likely encounter as parasitic disease are very common all over the world and are of particular importance in the tropics [9]. The parasite of fish can either be internal or external. The parasitic infection of fish gives an indication of the quality of water as they generally increase the abundance and diversity in more polluted water irrespective of the species, either through injury to the tissue organs in the process of burrowing or consuming food or the removal of digested food in the gut of the fish as well as the secretion of proteolytic enzymes. *C. gariepinus* has been plagued by various parasites in the wild and cultured environment where they cause morbidity, mortality and economic losses in aquaculture practice in various parts of the world. Various helminth parasites have been incriminated in *C. gariepinus* infection such as adult Digenea infecting different tissues of the body; trematode cercaria of the family *Clinostomidae* encysting in tissues; and adult *monogeneans* of the families Pousopothocetylidae, *Dactylogyridae* and *Gyrodactylidae* infecting the gills and skin. *Trematodes* are among the major parasites found affecting *C. gariepinus*, it damages the muscles of fish making it disgusting and unmarketable. In human flatworm causes a condition called Trematodosis. Fish roundworms (Nematodes) causes a condition in human called *Anisakiasis*. Fish tapeworms (*cestodes*) causes a condition in human called Diphyllbothriasis. *C. gariepinus* has shown high parasitemia of both medical and economic concern, it high level of endoparasites and ectoparasite may result in adverse conditions either to the aquatic system or to animals (human inclusive) who consumer this species of fish.

Reported parasite of *Clarias Gariepinus* across the geopolitical zone of Nigeria

In Africa, a checklist of helminth parasites of freshwater fishes has been published by. and various reports also exist from different countries of Africa, highlighting on intensities, prevalence, epidemiology and pathology of such parasitic infections. According to, the *Clarias* harbor majority of the infections which include the adult Digenea infecting different tissues of the body; trematodemetacercaria of the family *Clinostomidae* encysting in tissues; and adult *Monogenea* of the families Pousopothocetylidae, *Dactylogyridae* and *Gyrodactylidae* infecting the gills and skin. However, another report by recorded that *Clarias* infections with adult *trematodes* were rare. According to him, the adults and larvae of *cestodes*, nematodes and *acanthocephalans* occur in the intestine. There is also an appreciable documentation of parasite fauna of *Clarias gariepinus* in Nigeria. One of the earliest reports in

Nigerian inland waters concerning fish parasites was that of [10] preliminary information on the parasites in the Kanji reservoir. They observed that not many fishes were infected. However, in a similar study by [11] in Maiduguri, Nigeria heavy parasitic infection of fish species was observed. Borno State has water bodies and most of the population is involved in fish production. So, with the information that parasites affect fish production, it is important to know the prevalence of these parasites [12]. Reported that Amonotaeria and Polyonchobothrium species of (cestodes; and *Procamallanus* species of nematodes and *Neoechinorhynchus* species of acanthocephalans in wild and culture *Clarias gariepinus* in Nigeria. mentioned that *Caipillaria*, *contraecum* and cestodes in *Clarias gariepinus* caught from lake Hawassa, Ethiopia. As yet no epidemics of endoparasites have been reported in Nigeria, is likely that as fish culture becomes more intensive and widespread, fish parasites are likely to become a serious economic and health issues [6,13].

North west

At River Rima, Sokoto found Nematode (*Procamallanus laevionchus* and *Paracamallanus cyathopharynx*), Cestode (*Monobothrium wagneri*) and Acanthocephalan (*Neoechinorhynchus rutili*). In his investigation compare the presence of helminthic infections of some common species of fishes namely *C. gariepinus* and *oreochromis niloticus* in lake geriyo jimeta of Yola, Adamawa state where *C. gariepinus*, parasites were isolated *Clinostomium* species, *Procamallanus* species, *Serradacnitis serrata* and *Wenyonia* species the distribution of helminth parasites in the fishes showed a clear preference for the intestine as sites of attachment attributable to the availability of food in these regions. Observed a richer parasite species of *hirudinae* (Leech) and *Achantogyrus* spp in *C. gariepinus* from Lamingo Dam, Jos Nigeria. reported richer parasite species diversity (with much higher parasite prevalence of 40%) for both fish host species from Lake Geriyo in Yola, Adamawa state. They also reported *Clinostomum* spp. among the parasite found in both fish host types. Recorded the presence of tremades *acanthocephalan* species and species of *hurudinea* in *C. gariepinus* from Sabon gari market of Zaria in Kaduna state [14].

North east

Encountered four parasitic species, these include, 2 protozoans *Trichodina* spp., *Ichthyophthirius multifiliis*, and 2 *Helminthes* (cestodes) *Diphyllobothrium dendriticum*, *Diphyllobothrium latum*. *Ichthyophthirius muftifilis* in dam and pond samples examined in Bauchi metropolis. Sampled 100 species of *C. garipinus* from lake Alau in Maiduguri, Borno state. for endoparasite and ectoparasites, in which the following parasites where discovered. They include cestode, nematode and *trematodes*. The study shows that *C. garipinus* are afflicted by parasites that are of medical and economic importance. Project work in Tella Area of River Taraba by [15]. Revealed *Macrogyrodactylus* sp., *monogeneans*, *Ergasilus sarsi*, *Tetracampos ciliotheca* and *Monobothrioides*, woodland,

which are *cestodes* and *Procamallanus laevionchus*, a nematode were recovered in the river [16].

South

Recorded the following from Ase River Catchment, Delta State; *Trichodina*, *Epistylis* spp, *Chilodonella* spp, *Ichthyophthirius multifiliis*, *Camallanus polypteri*, *Procamallanus spiralis* & *Eucclinostomum heterostomum*. Iboh et al. (2016) both observed a richer parasite species of *hirudinae* (Leech) and *Achantogyrus* spp in *C. gariepinus* from Great kwara River in Cross River State. In Kwa River, Calabar, six helminths parasites recovered are *Tape-worm* species, *Anisakis simplex*, *Nippostrongylus brasilienses*, *Ascaris lumbricoides*, *Caenorhabditis elegans* and *Ancyrocephalids monogeneans* [17,18].

North central

In Abuja recorded *Procamallanus laevionchus*, *Rhabdochona congolensis*, *Polyonchobothrium clariae*, *Allocreadium* spp. & *Heterophyidae* spp. Parasites [19]. also recorded four species of *helminthes* parasites in Abuja comprises of two *Cestodes*, one nematode and one acanthocephalan isolated from the *C. gariepius*. The *Cestodes* were *monobothrium* sp and *polyonchobothrium clariae*. The nematodes were *procamallanus laevionchus* and the acanthocephalan was *Neoechinorhynchus rutili*. Equally found a low parasite species diversity (with only *cestodes* and *nematodes*) for *C. gariepinus* in Utako flowing gutter in Abuja, Nigeria [20]. Revealed *Camallanus*, *Diphyllobothrium latum* and *Capillaria* from River Gudi, Akwanga Local Government Area of Nasarawa State.

In where leeches (*pisciola geometra*) account for over 59% of the sample and midge larvae accounted for 41%. The rate of ectoparasites infestation of *C. gariepinus* in the University Research Fish Farm was observed to be high. Two kinds of ectoparasites (leech and midge larvae) were observed to be present on the skin of *C. gariepinus*. This might be because the skin is easily accessible by these parasites due to their direct contact with the surrounding water.

South west

Recorded presence of *acanthocephalans* in (Ibadan). In Osun State, Esa odo Reservoir, [21]. reported that *trematodes* (*Clinostomum tilapiae*), *achanthocephalans* (*Achantogyrus* spp) and *hirudinea* (Leech) are the parasitic taxa recovered [22], recovered *Procamallanus* sp, *Polyonchobothrium* sp, *Wenyonia* sp, *Pleuroceroid* larva and *Clinostomum* sp from Ogun River and Asejire Dam in South-West. found Protozoa (*Trypanosoma* sp) in Lekki Lagoon, Lagos. Similarly, in Lekki Lagoon, Lagos, [23]. Recorded three *cestodes* *Polyonchobothrium clarias*, *Stocksia puehuni* and *Wenyonia acuminata* and a nematode, *Paracamallanus cyathopharynx*.

South east

[24], carried out a survey on the endoparasites of *C. garipinus* in Owerri west local government area of Imo state. Where he re-

ported the following endoparasite species of nematodes (*Contra-caecum* and *camallanus species*), protozoans (*cryptobia iubilans* and *trypanosoma species*), and *acanthocephalans* (*acanthocephalus species*). This result shows the presence and prevalence of

endoparasite in owerri [25] In Abakaliki, recovered the following parasites *Trichodina spp*, *Procamalanus spp* & *Heterobranchus spp* (Table 1).

Table 1: Summary of reported parasite of *clarias gariepinus* across the geopolitical zone of Nigeria.

Author	State	No. Examined	No. Infected	Site of Parasite	Type of Parasites	Class of Parasite
Ogonna et al. [26]	Abakaliki	44	12	Intestine	<i>Trichodina spp</i> , <i>Procamalanus spp</i> & <i>Heterobranchus spp</i>	Protozoa, nematode & trematode
Okoye et al. [5]	Owerri West	60	41	Liver, kidney, stomach & intestine	<i>Contra-caecum sp</i> , <i>Acanthocephalus sp</i> , <i>Trypanosoma sp</i> , <i>Cryptobia iubilans</i> & <i>Camallanus sp</i> .	Nematode acanthocephalans & protozoa.
Olugbotemi et al. [21]	Osun	150	21	Skin, gill, Eyes, Kidney, liver, & intensive	<i>Clinostomum tilapiae</i> & <i>Achantogyrus spp</i> .	Trematode & achantoccephala
Hassan et al. [37]	Lagos	165	37	Blood	<i>Trypanosoma sp</i>	Protozoa
Kawe et al [19]	Abuja	83	56	Stomach, intestine & esophagus.	<i>Procamallanus laevionchus</i> , <i>Rhabdochona congolensis</i> , <i>Polyonchobothrium clariae</i> , <i>Allocreadium spp.</i> & <i>Heterophyidae spp.</i>	Nematode, cestode & trematodes
Cletus et al. [18]	Calabar	230	122	Liver, gill, stomach, skin & intestine	Tapeworm, <i>Anisakis simplex</i> , <i>Nippostrongylus brasiliensis</i> , <i>Ascaris lumbricoides</i> , <i>Caenorhabditis elegans</i> & <i>Ancyrocephalids monogeneans</i>	Cestoda, nematoda & monogenoidea
Aliyu et al. [20]	Abuja	32	18	Intestine	<i>Monobothrium sp</i> , <i>polyonchobothrium clariae</i> , <i>procamallanus laevionchus</i> & <i>Neoechinorhynchus rutila</i>	Cestode & nematode & acanthocephalan
				Gill, stomach, & intestine	<i>Procamallanus sp</i> , <i>Polyonchobothrium sp</i> , <i>Wenyonia sp</i> , <i>Pleurocercoid larva</i> & <i>Clinostomum sp</i>	Cestode & nematode
Salawu et al. [23]	Ogun	72	54	Intestine, stomach, liver, alimentary canal skin, swim bladder & spleen	<i>Trichodina</i> , <i>Epistylis spp</i> , <i>Chilodonella spp</i> , <i>Ichthyophthirius multifiliis</i> , <i>Camallanus polypteri</i> , <i>Procamallanus spiralis</i> & <i>Euclinostomum heterostomum</i>	Nematoda acanthocephalan, trematodes & protozoa
Edore E I [17]	Delta	90	60	Gill & digestive system.	<i>Macrogyroductylus sp.</i> , <i>monogeneans</i> , <i>rgasilus sarsi</i> , <i>Tetracampos ciliotheca</i> <i>Monobothrioides</i> , <i>woodland</i> & <i>Procamallanus laevionchus</i> .	Cestode & nematode.
Mathias BS	Taraba	140	140	Gill, fins, skin & intestine	<i>Diphyllobothrium dendriticum</i> , <i>Diphyllobothrium latum</i> . <i>Ichthyophthirius muftifilis</i> , <i>Trichodina spp.</i> & <i>Ichthyophthirius multifiliis</i> .	Cestodes & protozoan
Udechukwu et al. [15]	Bauchi	18	18	Intestine	<i>Polyonchobothrium clarias</i> , <i>Stocksia pujehuni</i> , <i>Wenyonia acuminata</i> & <i>Paracamallanus cyathopharynx</i> .	
Akinsanya et al. [24]	Lagos	360	17	Oesophagus stomach & intestine	<i>Procamallanus laeviconchus</i> , <i>Paracamallanus cyathopharynx</i> , <i>Monobothrium wagneri</i> & <i>Neochinorhynchus rutili</i> .	Cestodes & nematodes
Magami et al. [14]	Sokoto	30	30	Oesophagus stomach intestine & rectum.	<i>Clinostomum spp</i>	Nematode & cestode
Absalom et al. [21]	Nasarawa	100	63	Intestine	<i>Cestodes nematodes</i> and <i>leeches</i> .	

	Adama-wa			Skin and gills	Camallanus anabantis, Camallanus pearsei <i>Trypanosoma</i> .	Cestode
Biu	Borno	150	125	Skin and intestinal tissue.	<i>Hirudinae</i> (leech) and <i>achantogyrus</i>	Cestodes, nematodes and hirudinae
Okoye et al. [5]	150	125		Skin and body tissue		Protozoans
Iboh et al. [18]	Imo	100	85			Hirudinea
	Cross River	100	80			
		100	60			

Conclusion

Clarias gariepinus examined for both endo and ecto parasites respectively in several work reviewed in here shows different parasites belonging to different groups. These include cestode, nematode, trematodes and Protozoan. This parasite is medically important to human and animals as it effect economic value of fish produced and raised public health concern in the different geopolitical zones in Nigeria [26-42].

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