IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 12, Issue 12 Ser. I (December 2019), PP 05-09
www.iosrjournals.org

Prevalence of Haemoparasitesin *Clariasgariepinus* (Burchell 1822) of a Tropical River System; Implication for Fish Conservation Policy and Management

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Abstract: *The study on the prevalence of haemoparasites of Clariasgariepinus collected from the wild inEbonyi River was conducted between August to November, 2015 using standard haemoparasitological methods. The study revealed that out of 100 randomly sampled specimens of C.gariepinus examined, 90(90.0%) was infected. The prevalence of haemoparasites in relation to sex showed that 34 (85.0%) out of 40 male species and 56(93.3%) out of 60 female species were infected. The study also revealed that due to the invasion of haemoparasites on C.gariepinus, the infected samples recorded abnormalities in their blood parameters. Haemoparasites identified include Tryparosomamukasai 16(55.1%), Babesiosoma sp. 8(27.5%), Myxospora sp. 2(6.8%) and Haemogregarina sp. 3(10.3%). The result showed that Trypanosomamukasai recorded high prevalence of (55.1%) than other parasites. This study reveals a higher prevalence of haemoparasites in juvenile C. gariepinus as a result of anthropogenic activities that cause pollution and predispose them to infection risk factors. Haemoparasites can cause reduction in meat quality, protein efficiencies and reduce weight gain if not managed or curbed. Therefore, it is recommended that consumers should purchase adult fish that are more resistant to haemoparasites for consumption. Alsoproper enactment and education should be passed to human population in order to curtail more of the anthropogenic activities that cause aquatic pollution resulting to infection of fish.*

Keywords: *Clariidae,Clariasgariepinus. prevalence, haemoparasites, Ebonyi River*

Date of Submission: 27-11-2019 Date of Acceptance: 12-12-2019

I. Introduction

Fish as cheap and important source of protein do contain lipids, minerals, oils and vitamins. According to [1], fish is amongst the important sources of protein for humans and other animals in the tropics accounting for more than 40% of the protein diet of two-thirds of the global population. The fishery sector provides food for immediate consumption, economic gains and jobs as well as exportation with a steady market in developed countries and Nigeria is among the largest fish consumers relying greatly on fish importation as well as local production [2]. The most common fish available in Nigeria are the catfish species of *C. gariepinus*and *C. angularis*. The Africa sharp mouth catfish, *C. gariepinus* (Burchell, 1822) is widely distributed in Africa [3]; [4] occurring mainly in quiet waters, lakes and pools and also in lotic waters[5]. The species is an excellent species for aquaculture and biological research [6]. Fish production is mainly from the wild in most part of the globe, soas the world's population grows, fish resources are being exploited at an increasing rate causing over exploitation and degradation. Also the aquaculture industry is being plagued by the problem of overcrowding, poor environmental conditions and pollution. The above scenarios result in reduced immunity of fish and higher susceptibility to parasites and diseases [7]; [8] and [9]. Various parasites are associated with *C. gariepinus* in the wild and in the cultured environment where they cause morbidity, mortality and economic losses in aquaculture practice in various parts of the world [10]. Parasitic diseases of fish are of particular importance in the tropics. Fish parasite biodiversity and species composition in the aquatic realm depends on species richness of the final hosts and their ecosystem[9]. Parasites usually exist in equilibrium with their host as a survival strategy. However, in instances where hosts are overcrowded such as in aquaria or in fish farms, parasitic diseases can spread very rapidly causing high mortality. Although, this is usually not the case in the wild natural aquatic environments, it occurs when the environment is disturbed by human activity and interference especially with populations which alter the natural distribution of the parasite communities [2]. Knowledge of parasites and parasitic communities, allows researchers to recognize the role of the fish host in the food web or ecosystem [11]; [12];[13] and [14]. Thus this study seeks to determine the prevalence of haemoparasites in *C. gariepinus*fish stock fromEbonyi River, South eastern Nigeria.

II. Materials and methods

Study area: The sample (*C. gariepinus)* was collected from Ebonyi River located at Ebonyi North Senatorial zone (Izzi LGA) in Abakaliki, Ebonyi State of Nigeriabetweenlatitude of 064`N and longitude 087`E. (Fig. 1). The vegetation around the river is characterized by shrub are oil palms (*Elaeisguineesis).* There is relative amount of zooplanktons and phytoplankton which dry up during the period of November to March annually.The river is known to support agricultural and fishery activities as well as other domestic purposes. Farmers bring their harvested fishes and other products to the market close to the river (Ebonyi River).Some activities engage by people are usually in the dry season when water level in the river has reduced drastically. They also cultivate farm crops like cassava, maize, yam, melon, groundnut etc, during the wet season at the river bank. There is also water fluctuation in the river with season which goes a long way to determine the agricultural activities of the inhabitants during each period. During the dry season (November to March) some area of the river floor is seen and covered with sand, there by fishing activities are abandoned and most of fisherman would change over to another agricultural activities. But during the raining season, (April to September) water level will increase and the reverses the activities of the people.Several fishes are caught by different fishing methods used by the local fishermen who fish the river. The fishes are caught and sold to local market women who came from different communities located around the river. The fishing methods used include: Cast nets, hook and line, set line, drag nets, life nets and traps.

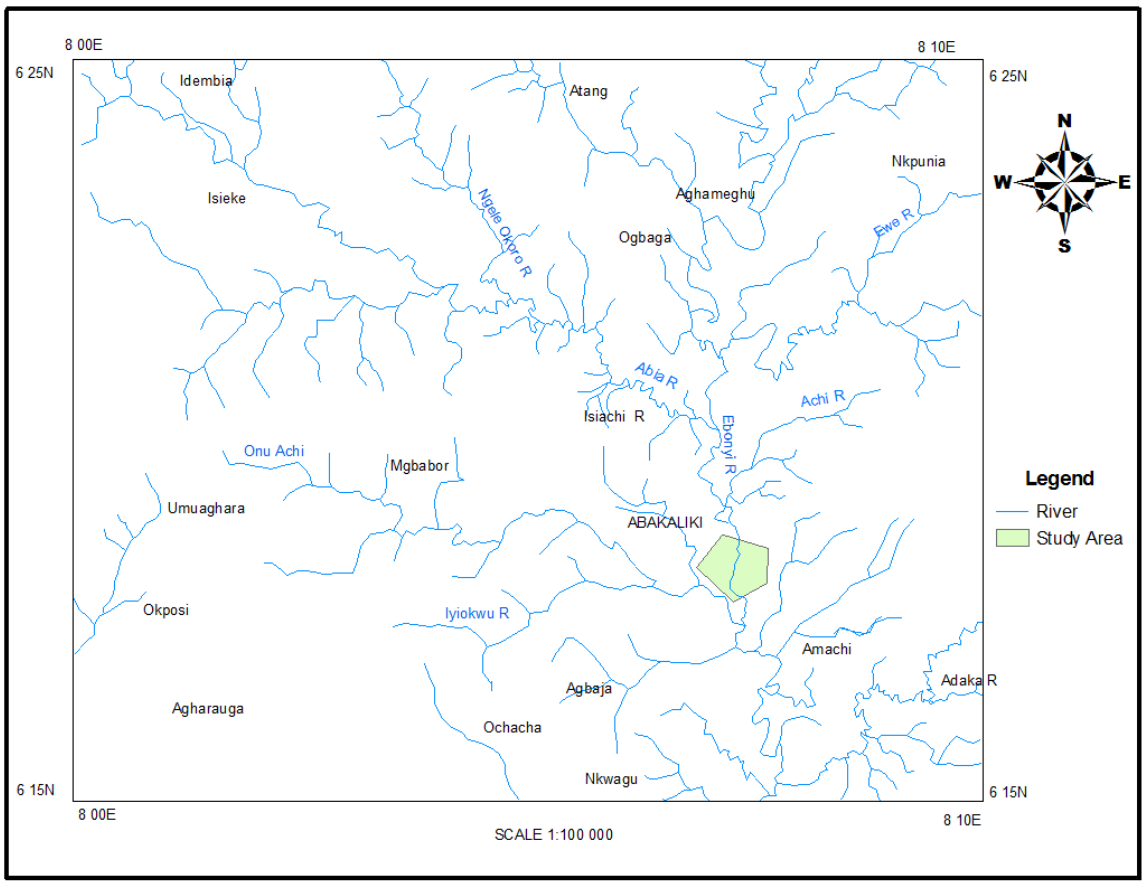

Figure 1. Map of study area (Ebonyi River)

Sample collection: A total of one hundred (100) randomly selected fresh samples of life *C. gariepinus*were purchased from local fishermen at Ebonyi River within the period of August to November 2015. Samples were taken immediately to the Applied Biology Department Laboratory for parasitological analysis.

Isolation and identification of parasites: Samples (*C. gariepinus)* collected from the wild at Ebonyi River were taken directly to the Applied Biology Department Laboratory, Ebonyi State University under life condition for haemoparasitic analysis. Samples were sorted and identified to species level using the guides of [15]. The species samples were preserved in absolute ethanol as voucher specimens. The morphometric analysis was carried out to determine the size (length and weight). The fishes were measured using electronic weighing

balance model FEJ 3000B for weight, while the meter rule was used for the total length (TL) of fishes measurement, from the tip of the snout to the tip of the largest lobe of the caudal fin. The fish were placed in the dissecting board where the samples of white blood cells were extracted through venous puncture along the lateral lines at the spinal cord into a sterile glass slide, also blood were collected through the operculum at the heart region using sterile syringe (5mls), the modified methods of [16] was used. Samples of blood extracted from the fish were prepared using a modified technique [17]. The blood samples were fixed with methanol and dried thereafter stained with Giemsa's stain as this may ensure the conspicuous morphological identification of the parasite life cycle stages. Parasites identified were recorded against the slide while samples of slide were prepared for each fish for empirical conviction after viewed with microscope.The observed parasites were compared with the keys of fresh water fish parasite pictorial guide by [18]. The parasites were counted and recorded.

III. Results

Blood smears from a total of 100 samples of *C.gariepinus* collected from Ebonyi River were examined for haemoparasites. *C. gariepinus*were observed to be infected with four kinds of haemoparasites: *Trypanosomamukasai*, *Babesiosoma*sp,*Myxospora*sp and *Haemogregraina* sp.Parasites composition and location in relation to their individual occurrence showed that *T.mukasa*collected from the tissue had the highest occurrence (55.2%) while *Myxospora*sp from the operculum had the least occurrence (6.9%) (Table 1). The prevalence of parasites of *C. gariepinus* in relation to sex revealed that male samples were more infected (62.2%) than female samples (37.8%) (Table 2).Prevalence of haemoparasites of *C. gariepinus* in relation to length (cm) in Table 3 showed that lengths 10-19cm TL had higher prevalence (22-34.4%) while lengths 19-21cm TL had a lower prevalence (10.0%). Prevalence of haemoparasites of *C. gariepinus* in relation to weight (g) indicated that higher infection rate in the weights 25-35g and 45-50g. Lower infection rates were recorded for weights 35-45g and 50-60g.

Table 1: Different species of parasites composition and location in relation to their individual occurrence.

Location	Parasites	No (%) of Occurrence
Tissue	*Trypanosomamukasai*	16 (55.2)
Tissue	*Babesiosoma*sp.	8 (27.6)
Operculum	*Myxospora*sp.	2 (6.9)
Liver	*Haemogregarina*sp.	3 (10.3)
Total		29

Table 2: The prevalence of parasites of *C. gariepinus* in relation to sex

Sex	No. (%) Examined	No. (%) Infected
Male	40 (40.0)	34 (37.8)
Female	60 (60.0)	56 (62.2)
Total	100	90

Table 3: Prevalence of haemoparasites of *C. gariepinus* in relation to length (cm)

Standard length (cm)	No. (%) of fish examined	No. (%) of fish infected
10-13	21 (21.0)	20 (22.2)
13-16	35 (35.0)	30 (33.3)
16-19	33 (33.0)	31 (34.4)
19-21	11 (11.0)	9 (10.0)
Total	100	90

Table 4: Prevalence of haemoparasites of *C. gariepinus* in relation to weight (g)

Total weight (g)	No. examined	No. (%) infected
21-25	23 (23.0)	22 (24.4)
25-30	17 (17.0)	17 (18.9)
30-35	11 (11.0)	11 (12.2)
35-40	9 (9.0)	8 (8.9)
40-45	10(10.0)	8 (8.9)
45-50	12 (12.0)	10 (11.1)
50-55	10 (10.0)	8 (8.9)
55-60	8 (8.0)	6 (6.7)
Total	100	90

IV. Discussion

The determination of haemoparasites of *C.gariepinus* collected from wild shows that out of 100 samples of male and female evaluated for haemoparasites, 90 (90%) samples of *C.gariepinus* were infected with blood parasites, the study revealed that more female were sampled than the male fish. The prevalence of haemoparasites of *C.gariepinus* indicates that female samples recorded higher infection rate than the male

samples. However, there was no significant difference in the prevalence rate in relation to sex (χ^2 = 1.852, df = 1, p = 0.05).Higher infectionrate could be that female voraciously feed on risk contaminated feed materials contained in the water which may have predispose them to infection. Female fish species could be considered dual feeder as they could feed on both plants and animal residents in water. *C. gariepinus* is considered one of the examples of an omnivore or predator feeding mainly on aquatic insects, fish and higher plants debris, they have also been found to feed on terrestrial insects, mollusc and fruit [19]. The investigation revealed that 16(55.1%) fish samples were infected with *T.mukasai* which were implicated from blood isolated from the tissues and can be attributed to diet and feeding habit. 8(27.5%) fish samples were infected with *Babesiosomasp* which were implicated from blood isolated from the tissue. 2(6.8%) fish samples were infected *Myxosporasp* which were implicated from the blood isolated behind the operculum while 3(10.3%) fish samples were infected from *Haemogregarina* which were implicated from the blood isolated from the liver. Species prevalence of haemoparasites indicates that *T. mukasai* 16(55.1%) were predominantly high amongst the four species of haemoparasites isolated. Theses could be attributed to [20], who reported prevalence of infection by *Trypanosome* in catfish *C.gariepinus* in lake Victoria was about 50%. [21]also reported a high infection of 43% prevalence in *C.gariepinus*. Higher prevalence of *Trypanosoma* infection 55.1% observed in the present study in *C.gariepinus* probably is due to increase in population of leeches in Ebonyi River. This assumption is based on the findings of[22] whose study investigated infections of *Hypostomus*spp. by *Trypanosoma*spp. and leeches, as well as blood parameters of this host in the network of tributaries of the Tapajós River in the state of Pará, in the eastern Amazon region in Brazil, the results suggested that the leeches were vectors of *Trypanosoma*spp. in *Hypostomus*spp. [20] noted that the protozoan parasite, Myxosporea are basically parasite found in the tissues where they cause histozoic infection and in the internal cavities e.g. in gall and urinary bladder where they cause coelozoic infection.Cases of mixed infection were also recorded between *T. mukasai* and *Babesiosoma*sp which occurred in the same fish sample, these could be observed that more than one haemoparasites might attack a single species as this could be related to the vulnerability of the fish risk contaminant.The prevalence of haemoparasite in relation to length revealed that small and young samples of *C. gariepinus* within the range of 13.5-16 cm TLand weight from 21-35gwere more prone to parasitic infection due to biotic and other anthropogenic factors while big and adult *C. gariepinus* at the range of 19.5-21 cm TL and weight range of 35-60g had lesshaemoparasiticinfection as they appear to be more resistant. There were no significant differences (χ^2 = 2.740, df = 3, p = 0.05)(χ^2 = 8.754, df = 7, p = 0.05) in the relationship between prevalence and length as well as weight of the fish sampled respectively.[23]stated that poor environmental condition and pollution often result in reduced immunity of fish and increased susceptibility to parasitic infection and disease.

V. Conclusion

Parasites and diseases reduce fish production by affecting the normal physiology of fish and which if, left uncurtail, can result in mass mortalities of fish, or in some cases infection of man and other invertebrates that consume them. Fish disease and histopathology, with broad range of causes, are increasingly being used as indicators of environmental stress since they provide a definite biological end-point of historical exposure and the pathological conditions arising from parasite infections, which leads to serious consequence especially the nutritive devaluation of fish. However, with the information that parasites affect fish production, it is important to know the prevalence of these parasites despite that people rely on fishing production for economic gains, job provision, protein-diet of two-thirds of the global population. The present result on the determination of haemoparasites of *C. gariepinus* in Ebonyi River reveals a higher prevalence of haemoparasites in juvenile *C. gariepinus* as a result of anthropogenic activities that cause pollution and predispose them to infection risk factors. However, it is recommended that proper enactment and education should be passed to human population in order to curtail more of the anthropogenic activities that cause aquatic pollution resulting to infection of fish and purchase adults fish that are more resistant to parasites for consumption.

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