FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 3 No. 3, September, 2019, pp 444 –448

PREVALENCE OF GASTROINTESTINAL PARASITES AND CONDITION FACTOR OF *AUCHENOGLANIS BISCUTATUS* (GEOFFREY ST. HILARIE, 1827) IN KIRI RESERVOIR, SHELLENG, ADAMAWA STATE, NIGERIA.

[*1]Vandi, P, [2]Daniel, J.L., [1]Chessed, G., [1]Augustine, L.M. [1]Cromwell, D.S. and [3]Francis, S.

[1]Department of Zoology, School Life Sciences, Modibbo Adama University of Technology, P.M.B. 2067, Yola, Nigeria.
[2]Department of Science Laboratory Technology, Gombe State Polytechnic, P.M.B. 0190, Bajoga, Gombe State
[3]Department of Microbiology, School Life Sciences, Modibbo Adama University of Technology, P.M.B. 2067, Yola, Nigeria.

* Corresponding Authors email**:** vandiphilips@yahoo.com

ABSTRACT

The present study was designed to investigate the prevalence of gastrointestinal parasitic infection in *Auchenoglanis biscutatus* in Kiri r**e**servoir, Shelleng, Adamawa State. *Auchenoglanis biscutatus* species were randomly sampled every month for a period of six months from May to October, 2017. Each specimen was dissected and the dissected fish intestine including the stomach was open up by means of a pair of dissecting scissors and placed in a Petri dish, dissecting microscope was used to check for the presence of parasites, identification keys was used to identify those parasites found, Chi square was used to show the prevalence of parasites in relation to sex, length and weight. The distribution of infected *Auchenoglanis biscutatus* showed an overall prevalence of 36 (46.75%), the prevalence in relation to sex showed that the Males had a prevalence rate of 20 (55.66%), while Females had 16 (39.02%) prevalence rate. The distribution of parasite species showed that male had 26 (50.98%) *Posthodiplostomulum minimum* metacercaria and 10 (52.17%) *Myxobolus sp.* with parasite load of 36, while the females had 25 (49.02%) *Posthodiplostomulum minimum* metacercaria and 8 (44.44%) *Myxobolus sp*, with a parasite load of 33. There is significant association between parasite infection and sex at $p > 0.05$. There is occurrence of gastrointestinal parasites in *Auchenoglanis biscutatus* found in Kiri reservoir, and thus good culinary practices should be adopted to decimate risks to public health.

Keywords: Gastrointestinal Parasites, *Auchenoglanis biscutatus*, Condition Factor, Kiri Reservoir, Shelleng.

INTRODUCTION

Parasitism is a relationship between two organisms in which one organism benefits, the parasite, while the other organism is harmed, the host animal (Roberts and Janovy, 2005). Usually, tissue damage occurs during the parasite's various life cycle stages, which are detrimental to the host, but can also make the host more susceptible to other diseases. Parasites are common in most ecological system and all free living organisms can be potential hosts to parasites; parasitism in itself is one of the most common lifestyles on earth (Madanire-Moyo and Barson, 2010). In general term, parasites do not show a preference for a certain host species and can affect many different host organisms, whereas some special parasites will only infect a few select organisms (Poulin, 1997). The body size of some parasite is one of the most important factors influencing the number of different parasite genera that are found (Rosas-Valdez and Perez-Ponce de Leon, 2011).

Bell and Burt, (1991), reported that the diversity of helminthes parasites, which include the digenetic trematodes (flukes), cestodes (tapeworms), nematodes (roundworms), and acanthocephalans (spiny headed worms), have been reported in other studies to correlate with host fish body size. This is because fish hosts constitute habitats and resources for parasites (Lafferty, 2012). Changes in the environment can affect the steps in the infection process, such as the survival of parasite transmission stages or host resistance, as well as modulating parasite virulence or host recovery rates (Mouritsen and Poulin, 2002; Lafferty, 2009). The present study is designed to investigate the prevalence of gastrointestinal parasitic infection in *Auchenoglanis biscutatus* in Kiri r**e**servoir, Shelleng, Adamawa State.

MATERIALS AND METHODS

The study was conducted at Kiri Reservoir in Shelleng Local Government Area of Adamawa State, Nigeria. It is located within; Longitude 9^0 40' 47" N 12^0 00' 51" E. The reservoir was built by damming the Gongola River to provide irrigation to Savannah Sugar Company (SSC) a large scale sugarcane plantation and processing company set up as a joint venture between the Nigerian Federal Government and the Commonwealth Development Corporation (CDC), London. The reservoir is 11.2km long, 20m high zoned embankment, with an internal clay blanket. The reservoir was completed in 1982 (ICE, 1990). The reservoir has a capacity of $615m^3$ (Enplan, 2004).

Sampling of Fish Species:

Fish specimens were procured from artisanal fishers using cast net and lift net at the landing site for the study. Sampling of landed catches was done twice in a month for a period of six months from May to October, 2017. The fishers used a wide range of fishing gear such as hook and line, long line, cast nets, gill nets and traps. On the landing site, fish specimen were randomly sort and identified using keys and descriptions by Olaosebikan and Raji, (1998) and Idodo-Umeh, (2003). Both male and female species were bought and conveyed immediately to the laboratory in plastic containers with ice-block for laboratory analysis on the same day as they were bought. A total of 77 *A. biscutatus* were sampled for this study. The fish were sacrificed using the mechanical stunning method.

Laboratory analysis

In the laboratory, the Total Length (cm) of each fish was taken from the tip of the mouth to the extended tip of the caudal fin using a measuring ruler to the nearest 0.1 cm. Standard Length (cm) for each fish was taken as measurement from the tip of the mouth to the caudal peduncle to the nearest 0.1 cm as described by Lowe McConnell, (1972). The total body weight in grams was measured for each fish species to the nearest 0.01 g using a top loading Mettler balance. The sex of *A. biscutatus* was determined only after dissection and noting the presence of testes or ovaries (Imam and Dewu, 2010). The gastrointestinal tract of individual fish was dissected from the rectum to the oesophagus and all helminths seen were carefully detached, processed using standard parasitological methods as described by Olurin and Samorin, (2006). The parasites obtained were counted and placed in physiological saline overnight in a refrigerator and later fixed in 5% formalin later. They were stained overnight with Ehrlich's haematoxylin solution and passed through graduated alcohol levels (30, 50, 70, 90 % and absolute) for 45 minutes to dehydrate, cleared in xylene and mounted on a glass slide in Canada balsam for examination and identification under the light microscope at x10 as described by Uneke, (2015). The identification of parasites collected relied on the key of identification by Paperna, (1996).

The prevalence of parasites infection was calculated using the model;

$$\text{Prevalence (\%)} = \frac{\text{Number of host infected}}{\text{Total number of host examined}} \text{ X } 100\%$$

(Akinsanya *et al.,* 2007)

Intensity of parasite was estimated using the model;

$$\text{Intensity} = \frac{\text{Total number of parasites species in a sample of fish examined}}{\text{Total number of fish host infected}}$$

The prevalence of parasite infection base on sex of fish was estimated using;

$$\text{Prevalence (\%)} = \frac{\text{Number of a particular sex of fish infected}}{\text{Total number of a particular sex of fish examined}} \text{ X } 100\%$$

(Goselle *et al.,* 2008)

Statistical Analysis

Chi square was used to determine the prevalence of parasites in relation to sex, length and weight

RESULTS AND DISCUSSION

The distribution of infected *Auchenoglanis biscutatus* showed an overall prevalence of 36 (46.75%), the prevalence in relation to sex showed that the Males had a total of 20 infected with a prevalence rate of (55.66%), out of 36 examined, while Females had 16 (39.02%) infected out of 41 examined. The distribution of parasite species showed that male had 26 (50.98%) *Posthodiplostomulum minimum* metacercaria and 10 (52.17%) *Myxobolus sp.* with parasite load of 36, while the females had 25 (49.02%) *Posthodiplostomulum minimum* metacercaria and 8 (44.44%) *Myxobolus sp,* with a parasite load of 33. There is significant association between parasite infection and sex at $p > 0.05$ (Table 1).

The prevalence of parasites in relation to the Standard Length showed that the highest parasitic infection in the size range of 21-23.9cm with 15 (19.48%) species infected, with a parasite load of 30 parasites, followed by the size range 24-26.9cm with 8 (10.32%) and 18-20.9cm with 8 (10.39%), with a parasite load of 16 and 13 respectively. The size ranges 12-14.9cm and 15 – 17.9 had 2 (2.60%) infected each, with a parasite load of 4 and 3 respectively. The size range 27-29.9cm had the least infected number with 1 (1.30%) with a parasite load of 3. There is significant different between parasite infection and length (cm) at $p < 0.05$ (Table 2).

The prevalence of parasites in relation to Weight showed that the weight range 100-124g had the highest with 22 (28.57%) species infected with a parasite load of 22, followed by the weight range of 125-149g with 6 (7.79%) species infected with a parasite load of 15, the weight range 75-99g had 5 (6.49%) species infected with a parasite load of 24, and 50-74g had 2 (2.60%) infected, with a parasite load of 5, while the least was 150-149g with 1 (1.30%). There is significant different between parasite infection and weight (g) at $p<0.05$ (Table 3).

The condition factor (K) for *A. biscutatus* showed that males ranged from 0.58 -4.68 (mean value of K=1.72± 1.03) females ranged from 0.47-4.68 (mean value of K=1.25±1.05) while combined sexes has the range of 0.52-4.05 (mean value of K=1.50±1.06) (Table 4).

Table 1: Prevalence of Parasites in Relation to Sex of *Auchenoglanis biscutatus*

			Parasites		
Sex	No. examined (%)	No. infected (%)	*Posthodip.* (%)	*Myxobol.* (%)	P. Load (%)
Male	36 (46.75%)	20 (55.56%)	26 (50.98%)	10 (55.56%)	36 (52.17%)
Female	41 (53.25%)	16 (39.02%)	25 (49.02%)	8 (44.44%)	33 (47.83%)
Total	77 (100%)	36 (46.75%)	51 (100%)	18 (100%)	69 (100%)

χ^2_{cal} =1.00, Tab=9.488, df = 4, p > 0.05

Key;

Posthodip.= *Posthodiplostomulum* minimum *metacercaria*

Myxobol.= Cyst of *Myxobolus sp.*

P. Load= parasite load

Table 2: Prevalence of Gastrointestinal Parasites in Relation to Standard Length of *Auchenoglanis biscutatus*

Stand. Length (cm)	No. examined	No. infected (%)	Parasite Load
12 – 14.9	3	2 (2.60)	4
15 – 17.9	6	2 (2.60)	3
18 – 20.9	20	8 (10.39)	13
21–23.9	26	15 (19.48)	30
24–26.9	13	8 (10.32)	16
27–29.9	9	1 (1.30)	3
Total	77	36 (46.75)	69

χ^2_{cal} =139.37, Tab=55.758, df = 40, p < 0.05

Table 3: Prevalence of Gastrointestinal Parasites in Relation to Weight of *Auchenoglanis biscutatus*

Weight (g)	No. examined	No. infected (%)	Parasite Load
50 -74	2	2 (2.60)	5
75-99	16	5 (6.49)	24
100 – 124	41	22 (28.57)	22
125 – 149	15	6 (7.79)	15
150–149	3	1 (1.30)	3
Total	77	36 (46.75)	69

χ^2_{cal} =107.76, Tab=46.194, df = 32, p < 0.05

Table 4: Condition Factor of all the *Auchenoglanis biscutatus*

Sex	Number examine	Range value (K)	Mean value (K)
Male	36	0.44-2.24	0.73±0.39
Female	41	0.43-2.64	0.78±0.49
combined	77	0.39-2.64	0.75±0.44

The dissected *A. biscutatus* showed high a prevalence rate of 46.5%. Previous studies have reported similar prevalence of helminth parasite infection in fish, such as those of Awharitoma and Okaka, (1999), who recorded 60.8% prevalence rate for cichlide fishes from Okhuaihe River in Edo State. Nwani *et al*. (2008), reported overall endoparasitic helminth prevalence of 41.9 % from four *Mormyrid* species in Anambra River. Uneke and Egboruche, (2015), reported overall prevalence of 75 % for intestinal helminths and protozoan parasites in *Schilbe mystus* from mid Cross River flood system in Ebonyi State; both rivers are situated in southeastern Nigeria. Onyishi and Aguzie, (2018), obtained a lower prevalence rate of 42.9% in *A. occidentalis* from in Ebonyi River at Eha-Amufu, Enugu state. These differences shows that parasitic infection rates vary greatly from one area to another and this depends on a number of factors like, the nature of the water which is reflected in the human use and the endemicity of infection in the area as well as the fish species.

In this study more males were infected than female with a significant association (χ^2_{cal} =1.00, Tab=9.488, df = 4, p > 0.05). this is similar with the report of Uneke, (2015), who recorded a prevalence rate based on sex showed that 15(12.5%) males were infected while 9 (7.5%) were female in *Oreochromis niloticus*, and Omeji, (2012), who observed that the prevalence in female *A. occidentalis* was lower (55.56%) than in males (60.00%), from Lower River Benue, Makurdi. However, there are inconsistent explanations in literature as regards the relationship between sex and prevalence of infections, some

indicating positive correlation and others showing the converse (Olurin *et al*., 2012). Nonetheless, Emere, (2000), reported differences in the rate of infestation between male and female fish, and attested it to differential feeding either by quantity or quality of food eaten, or as a result of different degrees of resistance or infection. Emere and Egbe, (2006), also reported that due to the physiological state of the female, most gravid females could have reduced resistance to infection by parasites. The species of parasites recorded in this study differs from those recorded by Awharitoma and Ehigiator, (2012), who recorded three species of parasites, *Acanthogyrus tilapiae*, *Dichelyne* sp and *Wenyonia virilis.* Much higher figures was recorded by Onwuliri and Mgbemena (1987) and Okaka (1991) who recorded 9 and 10 species of parasites respectively in Jos Plateau and Asa River Ilorin. According to size (length based), the report of the present study contradict that of Uneke, (2015), who reported a higher prevalence rate in smaller fish sizes in terms of length and weight measurements, and Akinsanya *et al.* (2007) reported that the low level of immunity in the smaller sized fish could explain the high prevalence of helminthosis, but Olurin and Samorin (2006) and Ray (2005) who observed that the larger the fish, the greater the susceptibility to parasite infection as adult fish consumes a great variety of foods and exhibit a great variety of feeding styles, hence the correlation of prevalence of parasitic infections with fish length which in turn correspond to fish age (Hussen *et al.*, 2012).

The combined K value of *A. biscutatus* (0.75±0.44) is lower to the report of Egbal *et al.* (2011) who recorded a condition factor of *A. occindentalis* in Kashm El-girba Reservoir as 1.905±0.501 and 1.7739±0.604 in Atbara River which is recommended as suitable for matured fresh water fish by Bagena and Tesch (1978).

CONCLUSION

In conclusion, there is occurrence of gastrointestinal parasites in *Auchenoglanis biscutatus* found in Kiri Reservoir, the parasite species identified were; *Posthodiplostomulum minimum* metacercaria and *Myxobolus sp.* Males had more infection rate than the females. The prevalence of parasites in relation to the Standard Length showed that the highest parasitic infection in the size range of 21-23.9cm while, the prevalence of parasites in relation to Weight showed that the weight range 100-124g had the highest species infected.

ACKNOWLEDGEMENT

The authors' wishes to acknowledge the contribution of the Late Chief Technologist, Mr. Kwalagbe, Bernard of the Department of Zoology, Modibbo Adama University of Technology Yola Adamawa State for the assistance rendered during the laboratory analysis of this research.

REFERENCES

Akinsanya, B. (2007). Histopathological study on the parasitised visceral organs of some fishes of Lekki Lagon, Lagos, Nigeria. *Life Science Journal,* 4(3): 70 –76.

Awharitoma, A. O. and Ehigiator, F. A. R. (2012). Helminth parasites of fishes from some rivers in southern Nigeria. *African Scientist,* 13(2): 30-48.

Awharitoma, A.O and Okaka, C.E. (1999). Observation on the cichlid fishes in Ikpoba River and their parasitic infection. *The Nigerian Journal of Parasitology*. 20: 129-137.

Bagenal, T.B. and Tesch, F.W. (1978). Age and growth. In: BAGENAL, T (ed), Methods for assessment of fish production in fresh waters, 3 rd edn. IBP Handbook No. 3, Blackwell Science Publications, Oxford, 101-136.

Emere, M.C. and Egbe N .E .L. (2006). Protozoan parasites of *Synodontis clarias* (A freshwater fish) in river Kaduna, Nigeria. *Best J. Appl. and Nat. Sciences* 3(3): 58-64.

Emere, M.C. (2000). Parasitic infection of the Nile perch (*Lates niloticus*) in river Kaduna, *Nigeria J. Aqua. Science.* 4 (15): 51-54.

Enplane Group (2004). Review of the public sector irrigation in Nigeria, Federal Ministry of Water Resources/ UN Food and Agricultural Organisation. Retrieved 2010-05-21

Goselle, N, shir, G. I., Udeh, E. O., Abelau, M. and Imandeh, G. N. (2008). Helminth parasites of *Clarias gariepinus* and *Tilapia zilli* at Lamingo Dam, Jos. *Nigerian science world Journal,* 3(4): 321-326.

Hussen, A.; Tefera, M. and Asrate, S. (2012). Gastrointestinal helminth parasites of *Clarias gariepinus* (Catfish) in lake Hawassa, *Ethiopia. Sci. J. Ani. Science* **1**(**4**): 131-136.

Idodo-Umeh, G. (2003). Fresh water fishes of Nigeria (Taxonomy, Ecological notes, Diet and Utilization). Idodo-Umeh Publishers Ltd. Benin City, Nigeria, p. 232.

Imam, T.S. and Dewu, R.A. (2010). Survey of Piscine ecto and intestinal parasites of *Clarias spp*. sold at Galadima Road Fish Market, Kano Metropolis, Nigeria. *Journal Biosciences Research and Communications* 22(4): 209-214.

Institute of Civil Engineers, (1990). Geotechnical instrumentation in practice: purpose, performance and interpretation: proceedings of the Conference Geotechnical Instrumentation in Civil Engeenering Projects. Thomas Telford. (Eds) P. 404.

Lowe-McConnell, R.H. (1987). Ecological studies in tropical fish communities. Cambridge University press, London, 382.

Nwani, C. D., Oti, E. E., Odoh, G. E. and Ezewanji, H. M. G. (2008). Endoparasite helminths of four *Mormyrid* species from a west African flood river system. *Pakistan Journal Biological Sciences,* 11(2): 202 – 207.

Olaosebikan, B. D and Raji, A. (1998). Field guide to Nigeria freshwater fishes. Federal College of freshwater fisheries Technology, New Bussa. pp. l06.

Olurin K., Okafor J., Alade A. and Oronaye O. (2012). Helminth parasites of *Sarotherodon galilaeus* and *Tilapia zilli* from river Oshun, Southwest Nigeria. *Intern. J. Aquacul. Sciences* 3(2): 49-55.

Olurin, K. B. and Samorin, C. A. (2006). Intestinal helminths of the fishes of Owa stream, South- west Nigeria. *J. Fish. Hydrobiology* **1**(**1**): 6-9.

Omeji, S. (2012). Gastrointestinal Helminth Parasites of *Auchenoglanis occidentalis* and *Synodontis clarias* from Lower River Benue, Makurdi, Nigeria. *Advances in Agriculture, Sciences and Engineering Research,* 2 (12): 544 – 549.

Onyishi, G. C. and Aguzie, I. O. N. (2018) Survey of Helminth Parasites of Fish in Ebonyi River at Eha-Amufu, Enugu state, Nigeria *Animal Research International* 15(3): 3112 – 3119

Paperna, I. (1996). Parasites, Infection and Diseases of Fishes in Africa. An update CIFA Technical Paper No. 31, Rome, FAO. 1996, 220 pages.

Ray, J. (2005). Fish diseases recorded in New zeal and with a discussion on potential source and certification procedures. Fish resource development occasion. Publication of New Zealand Ministry of Agriculture. 34

Uneke, B. I. (2015). Prevalence of Helminthes Parasites of Oreochromis niloticus in the Mid Cross River Flood System, Southeastern, Nigeria. *International Journal of Agricultural Sciences and Natural Resources.* 2(4): 78-82.

Uneke B. I. and Egboruche, J. (2015). Isolation of intestinal parasites of *Schilbe mystus* from the Mid Cross River flood system southern Nigeria. *AASCIT Journal of Health,* 2(4): 26 – 31.