

Parasites of *Oreochromis niloticus* from Nubia Lake, Sudan

*¹Mujtaba EL-Khair Shuaib, ²Abuelgasim Ibrahim Abuelhalim

¹Fisheries and aquatic animal researches center, Animal Resources Researchers Council, Sudan.

²Department of Zoology, Faculty of Science, University of Khartoum, Khartoum, Sudan.

***Corresponding Author:** Mujtaba EL-Khair Shuaib, Fisheries and aquatic animal researches center, Animal Resources Researchers Council, Sudan.

ABSTRACT

The aims of the study are to provide information about the parasites of *Oreochromis niloticus* in Nubia Lake, Sudan, Identify the collected parasites to the genus level and determine the prevalence and intensity of infection with respect to sex and length. A total of 1200 specimens of *O. niloticus* were investigated for parasites. The fish samples collected in the period from (September, 2015 to August, 2016) and were measured and sexed by internal examination of gonads. A total of 1200 specimens of *O. niloticus* from Nubia Lake were investigated for parasites. The results obtained in this study revealed the presence of (Nematode) *Contracaecum* sp., (Trematode) *Clinostomum tilapia*, cyst of *Clinostomum* sp. in buccal cavity and on kidney, The total infected fish were 953 from the total number of *O. niloticus* examined (1200) taken from the Nubia Lake. In 471 kidney samples the prevalence of parasites was 39.3% of infection and the intensity was 49.4%. In 261 buccal cavity samples the prevalence of parasites was 21.8% of infection and the intensity was 27.4%. The general percentage of infection was 79.4%. A total of infected male fish were 492 out of 611 males examined; and the total of infected female fish was 477 out of 589 females examined of *O. niloticus* from the Nubia Lake. The results obtained that there is no relation between the infection and the total length, the total weight and the sex. The infection is highest in January 91% and lowest in October 68%. The Kidney have the highest intensity (49.4%).

Keywords: *O. niloticus*, parasites, intensity and prevalence.

INTRODUCTION

Tilapia is a freshwater fish belonging to the family Cichlidae; they are native to Africa but were successfully introduced into many tropical, subtropical and temperate regions of the world during the second half of the 20th century (Pillay, 1990). The total world production of tilapias and other cichlids reached 2.6 million ton in 2004 and continued to rise up to 3.6 million tons in 2008 (FAO, 2010). *O. niloticus* became the most important target fish (Ighwela *et al.*, 2011). Nubia Lake came into existence in 1964, as a result of construction of Aswan High Dam in Egypt. It is located between 21.8 to 24.0N° and 31.3 to 33.1E° (Latif, 1984).

Parasitic infection and diseases are some of the factors hindering high productivity in fish farming (Doglel *et al.*, 1961; Kayis *et al.*, 2009). Parasites, common pathogens and parasitic diseases are very common in fish all over the world and are of particular importance in the tropics (Roberts and Janovy, 2000).

Fish parasites are numerous and many phyla in the animal kingdom have representative that are

parasitic to fish. Fish parasites result in huge economic losses as they increase mortality; increase farm inputs via increased treatment expenses and cause reduction in growth rate and possibly weight loss during and after the period of parasitic disease outbreak (Kayis *et al.*, 2009). Parasites and diseases of cultured and wild fishes may put fish production especially in tropics and sub-tropic countries in stake (Eissa and Mohamed, 2001). Parasitic diseases are considered to be serious problem rather than bacterial diseases in warm water fishes (Coulibaly *et al.*, 1995 and Eissa *et al.*, 1996).

OBJECTIVES

The objectives of this work are to:

- Provide information about the parasites of *O. niloticus* in Nubia Lake.
- Identify the collected parasites to the genus level based on their morphological features.
- Determine the prevalence and intensity of infection with respect to sex and length.

MATERIAL AND METHODS

Study area

Fish samples were collected from Lake Nubia which located between 21.8 to 24.0N° and 31.3 to 33.1E°, Northern State of Sudan; Its surface area is about 5200 km² with a maximum capacity of 165 km³ and mean depth of 25m; its 175m ASL. The Lake is 35 km across at its widest point. Fish samples were collected from September, 2015 to August, 2016.

Fish sampling

1200 Fish specimens of *O. niloticus* were collected during a 12 months period (100 specimens /month) using gill nets(mesh size 6, 10, 12cm) with the assistance of fishermen operating in the Lake. Collection was supplemented by fresh specimens from the commercial catch. Fish were examined fresh in the laboratory immediately after collection. Standard length (cm) and weight (gm) were obtained. The fish were sexed by internal examination of gonads as suggested by Smyly (1957). A total of 1200 fishes (*O. niloticus*) were investigated for parasites.

Collection and preservation of fish parasites

The fish body cavity was cut open ventrally and the alimentary canal was removed opened longitudinally and the parasites were collected in cold physiological saline in glass peter-dishes with the aid of dissecting lens or microscope. Live nematodes were killed by pouring hot 70% alcohol on them in Petri dishes and preserved in cold 70% ethanol to which 2% glycerin was added (Ash and Orihel, 1991). Trematodes were fixed in hot 4% formaldehyde and then transferred into 70% alcohol after 24hours (de Chambrier and Scholz, 2006).

Statistical Analysis

The prevalence of the parasites was defined as the total number of fish infected with the parasite divided by the number of fish examined (Margolis *et al.*, 1982). The parasite distributions were described using prevalence and intensity based on Ford, (1988). Prevalence was calculated using the formula:

$$\text{Prevalence} = \frac{\text{Total No. of infected fishes}}{\text{Total No. of fish examined}} \times 100$$

Infection intensity was calculated using the formula:

$$\text{Intensity} = \frac{\text{Total No. of parasites recovered}}{\text{Total No. of infected fish examined}}$$

Photography

Photography of parasites was by leitz daimx 20 fitted with digital camera (Olympus Sc100). The

photography was carried at The Fisheries and Aquatic Researches Center.

RESULTS

The results obtained in this study revealed the presence of (Nematode) *Contraecaecum* sp., (Trematode) *Clinostomum tilapia*, cyst of *Clinostomum* sp. in buccal cavity(plate 1,2,3) and on kidney(plate 4). A total of infected male fish were 492 out of 611 males examined; and the total of infected female fish was 477 out of 589 females examined of *O. niloticus* from the Nubia Lake. The results obtained that there is no relation between the infection and the total length, the total weight and the sex .The infection is highest in January 91% and lowest in October 68%(table 1).

Table1. The infected samples per month

Months	infected samples
September	72
October	68
November	82
December	82
January	91
February	83
March	80
April	80
May	82
June	87
July	74
August	72
Total	953
Percentage of infection	79.42%



Plate1. The location of (Trematode) *Clinostomum* sp. as a cyst in the buccal cavity of *O. niloticus* from the Nubia Lake



Plate2. Fresh (Trematode) *Clinostomum tilapia*. removed from the cyst in the buccal cavity and still alive in *O. niloticus* from the Nubia Lake.



Plate3. (Nematode) *Contracaecum sp.* in the buccal cavity of *O. niloticus* from the Nubia Lake.



Plate4. Fresh (Trematode) *Clinostomum sp.* removed from the cyst on the kidney and still alive in *O. niloticus* from the Nubia Lake.

DISCUSSION

In this result (Nematode) *Contracaecum sp.* is found in the buccal cavity of *O. niloticus* and this finding of *Contracaecum sp.* in *O. niloticus* is in the same line about the fish which was infected with (Omer, 1999; Dafalla, 1971, 1973; Hassan, 1976; Salih, 1997; Taha, 2003; Paperna, 1996; Khalil, 1969, 1971 and Molnar, *et al.*, 2006) but also I disagree with organs which are infected.

This study was revealed that (Trematode) *Clinostomum tilapia* and cysts of *Clinostomum sp.* was isolated from the buccal cavity and Kidney of *O. niloticus* from the Nubia Lake and this result agree with (Hassan, 1976; Omer, 1999; Ahmed, 1999; Salih, 1997 and Taha, 2003). My result is in contrast with (Paperna, 1996 and Omer, 1999) in the organ which is infected. The results obtained that there is no relation between the infection of *O. niloticus* by parasites and the total length, the total weight and the sex. The infection is highest in January 91% and lowest in October 68%.

CONCLUSION

The Conclusion summed up from this study is that positive result by parasites infection in *O. niloticus* from the Nubia Lake appearance in kidney, buccal cavity,. These include (Nematode)

Contracaecum sp., (Trematode) cyst of *Clinostomum sp.* and *Clinostomum tilapia.*). As I found positive result by parasites infection in *O. niloticus* also it may be found in another species of fish. The results obtained that there is no relation between the infection of *O. niloticus* by parasites and the total length, the total weight and the sex. The infection is highest in January 91% and lowest in October 68%.

RECOMMENDATIONS

- It is therefore recommended that more surveys to be conducted and more sites to be examined; the seasonality is very important in the study.
- More researches about parasites should be conducted.
- Share the finding and recommendations of these researches with the specialized authorities to take necessary measures to prevent the man from the zoonotic diseases, protect the fish as an important resource of national income and affordable animal protein.

REFERENCES

- [1] Ahmed, Samia H. (1999). The impact of helminthes parasites on the health status and tissue morphology of two commercial fish species *Oreochromis niloticus* and *Clarias lazera* in Khartoum State. *M.Sc. Thesis, Department of Zoology, Faculty of Science, University of Khartoum.*
- [2] Ash, L. R. and Orihel, T. C. (1991). Parasites; a guide to laboratory procedure and identification. ASCP Press, Chicago, USA.
- [3] Coulibaly, N. D.; Salembere, S. and Bessin, R. (1995). Larval clinostomiasis in cichlid fish in lake Kompienga in Burkinafaso, a threat to fishing and public health. *Res. Franco. Sante*, 5(3):189–193.
- [4] Dafalla, A. A. (1973). A nematode (Heterocephalidae) from the sinus venosus of *Tilapia*. *Sudan Notes and Records*: Vol. LIV: 173–185.
- [5] de Chambrier, A. and Scholz, T. (2006). Tapeworms (Cestoda) of freshwater fishes. Theoretical and Practical Course. pp 99. Unpublished.
- [6] Doglel, V. A.; Petrushevski, G. K. and Polyanski, Y. I. (1961). Translated by (Kabata) Parasitology of Fishes. Oliver and Boyd, Endinburgh, UK. 384 pp.
- [7] Eissa, I. A. M. and Mohamed, A. H. (2001). Further studies on host specificity and in vitro culture of *Trypanosoma Mansouri* from *Chrysichthys auratus* fish. *Suez Canal Vet. Med. J.*, IV (2):157–163.

- [8] Eissa, I. A. M.; Diab, A. S. and Badran, A. F. (1996). Studies on some internal parasitic diseases among wild and cultured *Oreochromis niloticus*. 7th *Sci Cong, Fac. Vet. Med.*, Assiut University, Egypt.
- [9] Food and Agriculture Organization (2010). State of World Fisheries and Aquaculture. Fisheries Department, Rome.
- [10] Ford, S. E. (1988). Host parasite interactions in eastern oysters selected for resistance to *Haplosporidium nelson* (MSX) disease. *W. S. Fisher American Fish Soci. Special Publication* 18:206-224
- [11] Hassan, M. (1976). Parasites of *Tilapia* spp. in the area around Khartoum. *M.Sc. Thesis, Department of Zoology, Faculty of Science, University of Khartoum*. Khartoum, Sudan.
- [12] Ighwela, K. A.; Aziz, A. and Abol-Munafi, A. B. (2011). Condition factor as an indicator of growth and feeding intensity of Nile tilapia fingerlings (*O. niloticus*) feed on different levels of maltose. *American-Eurasian J. Agric. Environ. Sci.*, 11(4):559-563.
- [13] Kayis, S.; Ozcelep, T.; Capkin E. and Altinok, I. (2009). Protozoan and metazoan parasites of cultured fish in Turkey and their applied treatments. *Israeli J. Aquac.-Bamidgeh*, 61:93-102.
- [14] Khalil, L. F. (1969). Studies on the helminth parasites of freshwater fishes of the Sudan. *J. Zool. London*, 158:143-170.
- [15] Khalil, L. F. (1971). Check list of the helminth parasites of African fresh water fishes. Commonwealth Institute of Helminthology, St Albans. Technical Communication No.42.
- [16] Latif, A. F. A. (1984). Fisheries of Lake Nasser-Aswan Regional planning; Lake Nasser Development Center. *Lake Nasser Synthesis*, pp.193-246
- [17] Margolis, L.; Esch, G. W.; Holmes, J. C.; Kuris, A. M. and Schad, G. A. (1982). The use of ecological terms in parasitology (Report of an. ad. hoc. committee of the American Society of Parasitologists). *J. Parasitol.*, 68:131-133.
- [18] Molnar, K.; Buchmann, K. and Szekely, C. (2006). Phylum Nematoda in fish diseases and disorders, Protozoan and metazoan infections, Vol. 1. (Ed:Woo, P.T.K.), CAB International, Wallingford, UK, pp. 417-443.
- [19] Omer, Wisal E. (1999). Studies on the Helminth Parasite of *Oreochromis niloticus* (Trewavas, 1982) in Khartoum State with special emphasis on their Impact on the Fish Health. *B. Sc. (Honours) Dissertation, Department of Zoology, Faculty of Science, University of Khartoum*, Sudan.
- [20] Paperna, I. (1996). Parasites, infections and disease of fishes in Africa: An update, CIFA Technical paper 31, FAO. Rome. 220 p.
- [21] Pillay, T. V. R. (1990). Aquaculture Principles and Practices. *Fishing News Book, Blackwell Science*, Oxford, UK, 575pp.
- [22] Roberts, L. S. and Janovy, J. (2000). Foundations of parasitology, 6th Edn., International Editions, Boston, USA.
- [23] Salih Muna, M. M. (1997). Parasitic and pathological studies on some inland fish species at Khashm El Girba Reservoir, *M.Sc. Thesis, Department of Parasitology, Faculty of Veterinary Science, University of Khartoum*, Sudan.
- [24] Smyly, W. J. P. (1957). The life history of bullhead of muller's thumb, *cottus, gobio* (L) *Zool Soci. London* 123:431-453.
- [25] Taha, Najlah, H. (2003). Studies on parasites of some commercial freshwater fishes at AI Kalakla AIqubba South of Khartoum. *M.Sc. Thesis, Department of Zoology, Faculty of Science, University of Khartoum*, Sudan.