Global Science Research Journals

ISSN: 2408-5464 Vol. 3 (7), pp. 265-269, October, 2015

http://www.globalscienceresearchjournals.org/

Global Journal of Fisheries and Aquaculture

Full Length Research Paper

Study on the prevalence and temporal abundance of parasites of fishes in Lake Elan

Gebawo Tibesso Bedasso

Ziway Fishery Resource Research Center, P.O. Box 229, Ziway

E-**mail**:-nadhi2521@yahoo.com, Tel: +251 912 15 27 64

Accepted 17 October, 2015

This study of Fish Parasites was carried out from September 2013 to June 2014 by collecting different fish species by using gillnets of various mesh sizes and hooks to assess the prevalence and seasonality of parasites of fish in a natural freshwater that can also be extrapolated to predict potential human health and risks and to determine their prevalence in selected water bodies, lake Elan. Thus, a total of 472 belonging to four species were examined. From totally examined, 50(10.6%) of them were found to be infected with different parasite. Six (6) species of parasites comprising two Digenea, two crustacean and two nematodes were isolated. The prevalence of each parasite shows different rates in fishes that was recorded during the study period. Among the types of fishes examined of which fifty were positive from the total (n: 472) twenty eight (of them were infected by Contracaecum larvae (5.93% of the total and 56% of the infected) while thirteen (2.75% of the total and 26% of the infected), and two (0.4% of the total and 4% of the infected) were Clinostomum spp and Eustrongylides respectively. These indicates higher prevalence of Contracaecum parasites during study period in Lake Elan. Among the parasites recorded in the present study, the Clinostomatid digeneans, Eustrongylides and Contracaecum nematodes could be medically important from public health point of view since the parasites can be transmitted to humans by eating raw or smoked fish. Therefore, further studies should be made for identification of other zoonotically important common fish parasites which might cause production loss in the fishery sector.

Key words: Fish, parasites, prevalence, Lake Elan

INTRODUCTION

It is estimated that there are more than hundred edible species of fish found in the inland waters of Ethiopia. Among the inland waters, the rift valley lakes have the majority of the fish species that have economically important to the food security of the country. However, along with the growing interest in the development of fish industries in the different sites of the area, there will be an increasing awareness of importance of fish disease as one of the major detrimental factors in factors in culturing fish in the coming future (ADF 2004).

The major diseases associated with fish are parasites, bacteria, viruses and toxic algae that reduces fish production by affecting the normal physiology of fish and if left uncontrolled, it can results in mass mortalities or in some cases, can be serve as source of infection for human and other vertebrates that consumed fish (Paperna, 1996). It is usually the parasitic infections that predispose fish to secondary infections like fungal, bacterial and viral disease (Sarig, 1976).

Freshwater fish can serve as definitive, intermediate or paratenic (transport) hosts in the life cycles of many species of protozoan, helminthes and crustacean parasites.

Fish parasite inflicted different kinds of damages by causing mechanical injury such as irritation, injury or atrophy of tissues and occlusion of the alimentary canal, blood vessels or ducts; introducing toxic metabolic by-products able to produce changes in the blood, enzyme, vitamin and/or hormone activity of the host, depriving the fish, acting as carriers or vectors of other pathogens, providing a point of entry for other pathogens through mechanical damage. They can also spoil the appearance of fish and usually affect the marketability of commercially produced fish, thus raising public health concerns especially in areas where raw fish is eaten (Paperna, 1996). In natural systems, they may threaten the abundance and diversity of indigenous fish species.

Fish production in Ethiopia as other developing countries, is strengthened by the availability of extensive inland water systems made up of streams, rivers and lakes which support a large number of fish species, many of which are of economic importance. To fully develop and manage these diverse and rich fish resources in these inland water bodies, there is need for adequate knowledge of parasites that infect them with a view to adopting preventive and control measures to improve fish yield. This study therefore aimed to identify the most common economically important parasite of fish and to assess the prevalence of the parasite in lake Elan.

MATERIAL AND METHODS

Description of the study area

Lake Elen is Rift Valley Lake which is located between 80 22.1' N and 38056.6' E at an altitude of 1598 m above sea level. The lake is found near to Awash River few kilometer from Koka reservoirs upstream. The Lake has an area of 250 hectares (Abebe, 2010).

Collection of specimens

Samples of fishes (n:472) of which *Clarias gariepinus* (53), *Oreochromis niloticus* (88), Cyprinous carpio (231) and Labeobarbus *intermidus* (100) were collected monthly (September, 2013 – June, 2014) using different mesh size of gill nets from the selected sites. The gears were set in the afternoon and lifted in the following morning. In addition, fish caught by fishermen was included to provide a wide range of fish and to supplement the data on certain aspects of parasite infestation of the fish. The fish samples collected were immediately examined for ectoparasites with the help of hand lens and then transported to the Ziway fishery resource Research center laboratory in ice medium for further examination for parasites.

Sex determination

The sexes of the fish were determined using one or more of three procedures: i) the abdomen of each fish specimen was pressed for the extrusion of whitish milt (for males) or eggs (for females). This approach was used if the fish was in ripe or running stage; ii) the fish was dissected for the presence or absence of testes or ovaries. Presence of testes signified maleness, while the presence of ovaries indicated that the fish was a female; iii) the gonads were excised and examined under the microscope for immature eggs or milt and conclusion made as in (i) above.

Examination of fish for parasites

Any abnormalities on the fish were recorded. A hand lens, microscope and unaided eye was used for quick identification of ectoparasites on the external body surface (scales, gills, fins, opercula and eye) of the fish samples. The gut was cut into oesophagus, stomach, small intestine, large intestine and rectum and examined for endoparasites using clean implements to avoid transfer of parasites from one site to another. Special note was taken of any damage to tissues/organs of the host by recovered parasites. Brain of African catfish was dissected longitudinally and the cranial cavity was washed away into Petri dish using water dropper and checked for parasites. Each parasite that get each fish were kept in a plastic bag containing 4% formaldehyde solution.

Fixation and preservation of parasites

Fixing and preserving of each parasite specimens was done according to the procedure employed by Paperna (1980), Yamagutti (1971) and Bykhovskaya-Pavlovskaya (1964). Larva nematodes were fixed in 4 % formalin and later stored in the saline solution. Encapsulated larvae were carefully dissected before the tissue was fixed. Preserved larvae was cleared in lactophenol and then observed under low power magnification. Adult nematodes were fixed in hot formalin to insure their relaxation and preserved in 4 % formalin mixed in 1 % glycerin to avoid accidental drying.

Parasite Trematodes and Cestodes were fixed in AFA (Alcohol Formalin Acetic acid).Crustacean parasites were fixed in 70% alcohol or 4% formaldehyde. Each parasite was collected in labeled flat bottom tubes containing the specific preservative or fixative agent. Length of Nematodes, Crustacean and Trematode parasites was determined. For microscopic study, Nematodes were cleared in lactophenol for 24 hours and examined under lower magnification microscopy. In the case of Trematodes and Cestodes, diagnosis was made after being carmine stained and cleared in absolute alcohol followed by 70% alcohol.

Crustacean parasites was examined both alive and after fixed in either 70% alcohol or 4% formaldehyde, stained in cotton blue and cleared in lactic acid. Live specimens of Crustaceans was recovered by collecting these parasites in

normal saline.

Identification of parasites

The identification of parasites collected relied on (i) the comparison of distinctive body shapes and the morphological features of the collected specimen and those described in literature; (ii) a key to identification modified from Frimeth (1994) for identification of the major taxa of adult parasites of fish.

RESULTS

Occurrence of parasites in sampled fishes

Out of 472 individuals of fishes examined during the study period (September, 2013 to June, 2014), 50(10.6%) were infected with parasites. The prevalence of the parasite was found in different rate. The identified parasites were recorded as, *Contracaecum, Clinostomum, Eustrongylides,* Diplostomum spp, lernea elegans and Dolophus.

Prevalence of each parasite species identified during study period

The prevalence of each parasite shows different rates in fishes that was recorded during the study period. Among the types of fishes examined of which fifty were positive from the total (n: 472) twenty eight (of them were infected by *Contracaecum* larvae (5.93% of the total and 56% of the infected) while thirteen (2.75% of the total and 26% of the infected), and two (0.4% of the total and 4% of the infected) were *Clinostomum* spp and *Eustrongylides* respectively. These indicates higher prevalence of *Contracaecum* parasite during study period in Lake Elan.

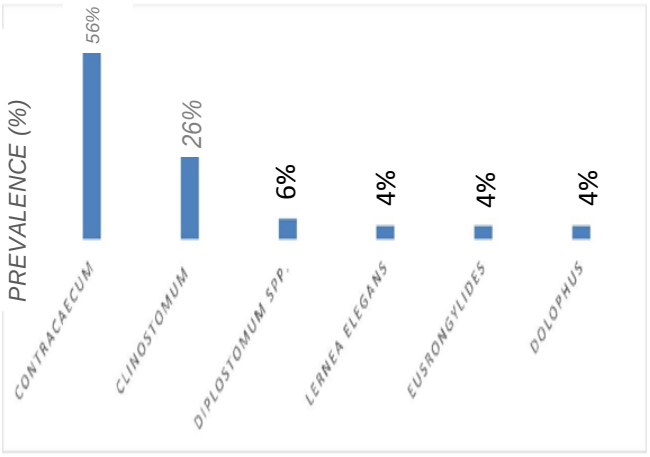

Figure 1: Prevalence of parasites from sampled fish

Over all prevalence in male and female fishes

Sexes were assessed to observe their influence on the parasite infection results. when analyzing the infection rate of all examined parasites larvae by host sex shown two hundred twenty eight males examined of which 26(11.4%) infected, on the other hand, out of 244 females examined, 24(9.8%) were infected. Generally, there was no significant difference in prevalence among the sex groups for all parasite species.

Table 1: Prevalence of parasites on sex base of the host (n: 472)

Sex	number of examined	number of infected	%age (infected)
Male	228 (48.3%)	26	11.4
Female	244 (51.7%)	24	9.8
Total	472 (100%)	50 (10.6%)	-

Temporal distribution of Infection

Figure 2 shows that the prevalence of parasites in sampled fishes in relation to time variation. Relatively high prevalence (20%) was recorded at June followed by March and the lower parasites prevalence (7%) was observed on December.

DISCUSSIONS

Most of the chronic diseases of fish are caused by animal parasites. Although, many others are not harmful, for instance the external protozoans are the largest group of pathogenic organisms in warm waters but most of them are harmless .However, no pathogenic protozoan was found during this investigation. The helminthes were found to be more prevalent.

The results of the present study showed that the prevalence of 10.6% which is far lower than the previous reports of 75.67% (Temesgen, 2003) at Lake Hawassa, 73.24% (Teferra, 1990) at Lake Tana, 48.12% (Shibru and Tadesse, 1997) and 58% (Amare, 1986) at Lake Hawassa. The variation of prevalence rate in the same lake might be the dynamic nature of parasitism and the variation between these lakes are probably due to geographical difference offering suitable ecological niches for the parasites and/or affecting the susceptibility of the hosts and the availability of intermediate hosts. Since, the definitive hosts of *Clinostomum* species are birds like herons, darters, cormorants and pelicans. Trematodes are established in the mouth and pharynx of these piscivorous birds (Paperna, 1991). It is likely that a large population of piscivorous birds around the lake harbor the adult parasites. *Contracaecum* species that infect freshwater fish are usually found as adults in fish-eating birds, such as cormorants and pelicans. Larval

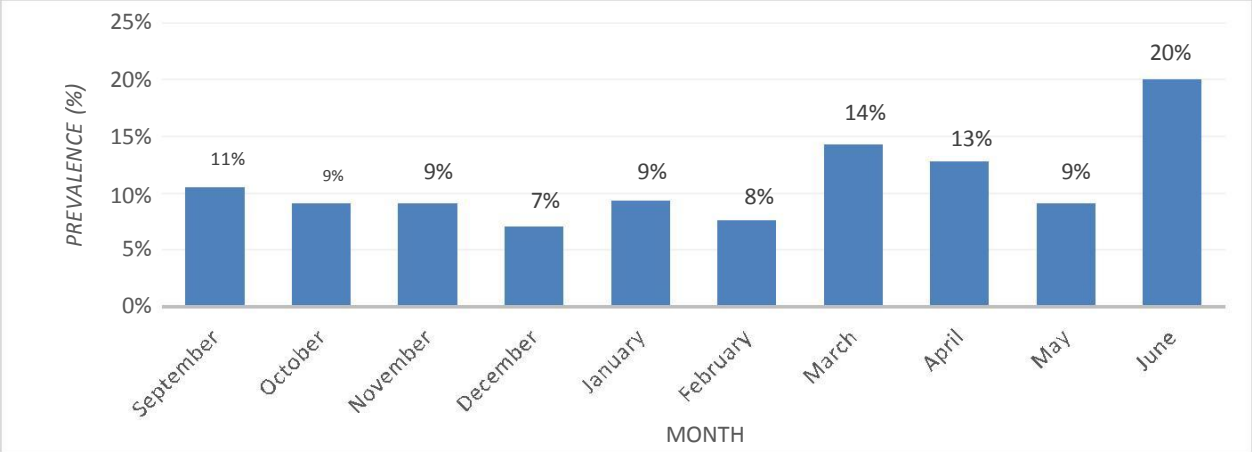

Figure 2: Temporal distribution of parasites from sampled fish

stages are seen in cyprinids (carp and related species), ictalurids (channel catfish), centrarchids (sunfish and bass), tilapia and other cichlids, and percids (perch).

Infection by *contracaecum* and *clinostomum* species have been reported in *O. niloticus* from the lake Ziway (Lemma, 2013) with the prevalence of 28% which was higher than present study. Ali (2009) was reported the prevalence of *Contracaecum* and *Clinostomum* sp (25.9%) from different iraq water bodies which was also higher than this study. *Eustrongylides* was the third type of parasite recovered during the study period, with an overall prevalence of 3.0% which was relatively nearest with paperna 1991 (1%).

Among helminthes identified during the study period from sampled fish species, Clinostomatid digeneans and nematodes of the genus *Contracaecum* could represent human health risk factors by eating raw or smoked meat of parasitized fish. *Clinostomum complanatum* is known to cause laryngopharyngitis infections in humans as was reported in Japan and Near East (Paperna, 1980) resulting apparently from ingesting inadequately cooked fish. The works of Dias *et al.,* (2003) and Paperna (1996) also reveal that egret and cormorant birds are definitive hosts for *C. complanatum* though it failed to become established in pelicans (Finkelman, 1988).

The genus Clinostomum was observed mostly in the branchial cavity and few were found in the skin of Nile tilapia and other fish species and the former case may reduce the possibility of the parasites to infect humans by eating the fillet only. However, the .possibility of infection is higher if smoked fish is eaten as the metacercariae of the parasite can be encysted behind the gill of the host fish and easily be ingested by the consumer.

The most prevalent larval nematodes were *Contracaecum spp.* recovered from mesentery of African catfish and the pericardial cavity of other two fish spp. Eshetu et al., (1999) reported a prevalence of 2.09% of this genus from Lake Chamo. Eshetu (2000) also reported prevalence of 15.35% from Lake Ziway which is also in the Ethiopian Rift valley system. Identification of these larval nematodes to species level is difficult unless it is supported by DNA sequencing technique linked with their adult identification from the definitive bird hosts. Encapsulated larval nematodes are known to cause fibrous capsule (Paperna, 1980) and the non-encapsulated larvae cause extensive tissue damage by migration and these effects were observed in mesentery of African catfish during our field work especially on those with high parasite load. Apart from this, the larval stages of *Contracaecum multipapillatum* were reported as potentially zoonotic parasite in Mexico (Vidal-Martinez *et al.*, 1994). Another parasite species, the nematode *Eustrongylides ignotus* was also reported to be infectious to humans (Barros et al., 2004) and the presence of the genus Eustrongylides in mesentery of African catfish from Lake Chamo was indicated by the work of Eshetu *et al.,* (1999).

D. ranarum was recovered from African catfish and *Labeobarbus intermidus* with intensities of up to 26 parasites per host and the prevalence was 4% in this study. This species of crustaceans were also reported from Lake Tana on one African catfish out of 124 examined fish (Eshetu and Mulualem, 2003). They were also observed on Nile tilapia from Wonji out of cages, Lakes Babogaya and Awassa but with lower prevalence and intensities ranging from 3 to 8.6% and 1 to 3 *D. ranarum* per fish respectively.

CONCLUSION AND RECOMMENDATIONS

Apart from economic and public health importance, parasites impair fisheries activity. At the lakes, the harvested fish, fishing equipment and fishermen are loaded on the too narrow boat. Therefore, parasites that detach from the fish host bite the bare foot of fishermen causing pain, bleeding and breakage of skin that might allow the entrance of other organisms which may cause anxiety and fear among young fishermen employed in the job. The present study shows that the proportion of

parasites differ in prevalence. It may be difficult to draw a definite conclusion that particular parasites is definitely absent from a particular water body. Thus further investigation in all water bodies are urgently needed to determine the effect of parasite infestation and their seasonal dynamics. *Clinostomum,* Eustrongylides and *Contracaecum* species could therefore represent potential health risks of eating uncooked or slightly cooked fish.

Based on the above findings and conclusion the following recommendations are forwarded: Medical survey on occurrence of laryngopharyngitis should be done on people eating uncooked/ smoked fish, Identification of the genera Clinostomum and Contracaecum to species level is important to check for the occurrence of zoonotic parasites, Parasite status should be taken into consideration in the study of stocking density of fish, Capacity building in fish parasitology and pathology by establishing network with international institutes experienced in the field.

Consumers should not eat uncooked or slightly cooked fish and health education should be given for them on the risk of eating raw and partly cooked fish.

REFERENCES

Abebe T (2010). The Effect of stocking density and supplementary feed on growth performance of Nile tilapia [(*Oreochromis niloticus* (Linneaus, 1758)] in cage culture system in Lake Elen, Ethiopia

ADF (African Development Fund) (2004). Fisheries Resources Development Plan Study. Agriculture and Rural Development Department; North, East and Southern regions. 83 Pp Ali, B. Al-Zubaidy, (2009): Prevalence and Densities of Contracaecum sp. Larvae in Liza abu (Heckel, 1843) from Different Iraqi Water Bodies. Department of Marine Biology & Fisheries, Faculty of Marine Science & Environment, Hodeidah University, Yemen. JKAU: Mar. Sci., Vol. **20**, 3-17 pp:

Amare T (1986). Parasites of fish from Lake Awasa and Chamo, DVM. Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia. Pp. 13-15.

Barros, L.A., R. Tortelly., R.M. Pint and D.C. Gomes (2004). Effects of experimental infections with larvae of *Eustrongylides ignotus (*Jäegerskiold, 1909) and *Contracaecum multipapillatum* (Drasche, 1882) Baylis, 1920 in rabbits. *Arq. Bras. Med. Vet. Zootec,*56(3):325-332.

Bykhovskaya-Pavlovskaya, A.I., Gusev, A.V., Dubinia, M.N., Izyumona, N.A., Smirnova, T.S., Sokolovskaya, I.L., Shtein, G.A., Shul´Man, S.S. and Epshtein, V.M. (1964). Key to parasites of freshwater fish of the U.S.S.R. Israel Program for Scientific Translations. Jerusalem, Israel. Pp. 1–234.

Dias, M. L.G.G, Eiras, J. C., Machado, M. H., Souza, G. T. R. And Pavanelli, G. C. (2003). The life cycle of *Clinostomum complanatum rudolphi*, (Digenea, Clinostomidae) on the floodplain of the high Paraná River, Brazil. *J. parasitology research*; 89 (6):506-508.

Eshetu Yimer, A. Kebede, and Y. Biruk (1999). Preliminary survey of parasites of fish at Lake Chamo. *In*: Proceedings of 7th annual conference of the ESAP (Ethiopian Society of Animal Production); Addis Ababa, Ethiopia.

Eshetu Yimer (2000), Preliminary survey of parasites and bacterial pathogens of fish at Lake Ziway. *In*: *SINET: ETHIOP. J .SCI*. 23(1):25-33. Faculty of Science, Addis Ababa University, Ethiopia.

Eshetu Yimer and Mulualem Eneyew (2003). Parasites of fish at Lake Tana, Ethiopia. *In SINET ETHIOP.J.SCI,* 26(1):31-36, 2003. Faculty of science, Addis Ababa University, Ethiopia

Finkelman, S. (1988). Infections of Clinostomatidea in the Sea of Galilee fish. MSc Thesis, Faculty of Agriculture, Hebrew University of Jerusalem (Hebrew text, English summary).

Frimeth JP (1994). NWFHS Laboratory Procedure Manual. 1:3 p.

Lemma A. (2013). Study On Temporal Variation of Internal Fish Parasites in Lake Zwai, Ethiopia. African journal of fisheries science Vol 1. Pp 001-004

Paperna, I. (1980). Parasites, infections and diseases of fish in Africa. CIFA Tech. Pap. 7:216. Paperna, I (1991): Disease caused by parasites in the aquaculture of warm water fish, Ann. Riv. Fish Dis. (1). pp. 155-194.

Paperna, I. (1996). Parasites, infections and diseases of fishes in Africa - An update *CIFA Technical Paper.* No.31. Rome, FAO. 220p.

Sarig, S. 1976. Fish Diseases and Their Control in Aquaculture.FAO Technjcal Report No32. Shibru, T, Tadesse GE (1997): Observation on parasites of *Tilapia nilotica* and *Claries mossambicus*, at Lake Awasa, Ethiopia*. J. Agr. Sci. (*2). Pp.126-130.

Teferra, W (1990): Parasites of fish from Lake Tana. DVM. Thesis, Addis Ababa University Faculty of Veterinary Medicine, Debre Zeit, Ethiiopia. P. 14.

Temesgen, Z., (2003): Study on parasite of fish at Lake Awassa. DVM thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre Zeit, Ethiopia. P.12.

Vidal-Martinez, V.M.; Osorio-Sarabia, D.; Overstreet, R.M. (1994). Experimental infection of *Contracaecum multipapillatum* (Nematoda: Anisakinae) from Mexico in the domestic cat. *J. Parasitol.,* 80:576-579.

Yamagutti S. (1971): Synopsis of digenetic trematodes of vertebrates. Part I, II. Keigaku Publishing Co., Tokyo, pp. 1074 + 349