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Study on the Prevalence and Temporal Variation of Common Internal Parasites in Nile Tilapia Common Carp and Catfish in Lake Langano

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ABSTRACT

This study was conducted from November, 2019 to April, 2018 to assess temporal variation of parasites of fish and to determine their prevalence in selected water bodies Lake Langano. Thus, a total of 428 O. niloticus (189), C. gariepinus (141), and C. carpio (98) were examined for internal parasites in Lake Langano. From this total examined, 248 (57.9%) of them were found with larvae of Contracaecum, Clinostomum, Eustrongylides and Diplostomum in different internal parts of the body. The prevalence of each endo-parasite shows different rates among three types of fishes examined of which 122 of them were infected by Contracaecum larvae (28.5%) of the total and 49.2% of the infected; 76 (17.8%) of the total and 30.6% of the infected, 40 (9.34%) of the total and 16.1% of the infected and 10 (2.3%) of the total and 4.03.% of the infected were Clinostomum sp, Eustrongylides and diplostomum respectively. This indicates higher prevalence of Contracaecum showing statistically significant difference ($P< 0.05$). Sexes were assessed to observe the prevalence and among192 males examined 107 (55.7%) infected. On the other hand, out of 236 females examined, 131 (55.5%) infected. This indicates that both sexes are equally affected. There was not significant variation in the overall infection for sex difference of examined animals ($p>0.05$). When analyzing the infection rate of all examined endo-parasites, larvae by host sex but the prevalence was a bit higher in females. The prevalence of endoparasites in O. niloticus, C. carpio and C. gariepinus examined during study periods in relation to their temporal variation and abundance is highest in April (10.04 %) and November (9.6%) respectively, and lower in other monthes. Therefore, there was Stastistically significant variation ($p < 0.05$) when the temporal variation and abundance were tested by chi. Squere test. In conclusion prevalence of endoparasites in O. niloticus C. carpio and C. gariepinus in Lake langano was (57.9%). the recorded parasites in the present study, 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, furtherstudies on other existing parasites and bacterias in the lake needed to provide more comparative study and identification of each genus to species level by molecular biology is important.

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Introduction

Knowledge of fish parasites has been accumulated in many parts of the world especially in Europe, Russia and USA, but such comparative studies in Africa have been lacking until recently. Research commitments to the study of parasites of fresh water and marine fishes of the African continent have been sporadic and inadequate considering the fish wealth of the continent. This has been attributed to the lack of laboratory equipment, skilled manpower, lack of public awareness on the fish production and health, library facilities [1].

As a landlocked country following the secession of Eritrea in 1993, fisheries in Ethiopia come exclusively from inland sources. In 2008, fish catch was estimated at around 17,000 tons (accounting for about 1.7% of the regional volumes), the bulk of which (74%) originating from the six main lakes (Tana, Ziway, Langano, Hawassa, Abaya and Chamo) and a further 26% from the other water bodies. The countries fish potential is estimated at 45,000–51,500 tons per year, according to several sources. Thus, less than 38% of this potential is currently exploited, demonstrating considerable room for further expansion through proper management. The construction of new reservoirs, under-exploited river fisheries and aquaculture are some of the development prospects to this end (FAO, 2012).

Aquaculture is recognized as an alternative means of achieving food security and poverty reduction in the rural area, and is now considered as an integral part of rural and agricultural development policies and strategies in Ethiopia. However, much remains to build institutional capacity in the areas of research, technology and training, which will require external assistance [2].

Fish are the most diverse group of vertebrate animals occupying a variety of marine, fresh and other water habitats. They are cold-blooded or poikilothermic animals. Their body temperature varies passively in accordance with the temperature of the surrounding water. Although fish as a group are tolerant of wide range of temperatures, from just below zero-degree 45-degree centigrade individual species generally have preferred optimum, as well as a more restricted temperature range. Each species of fish has preferred ranges for the various parameters of water quality, such

as temperature, dissolved oxygen and salinity [3].

Two hundred local fish species have been identified in Ethiopia, while the bulk of the production is made of Tilapia, Lates, Barbus, Bagrus, Clarias and Labeo species. Approximately 80% of the catch is Tilapia, although Nile perch is caught in large quantities on Lakes Chamo and Abaya, as well as in major riveting fisheries. Most of the remainder of the lake catches consists of catfish and Barbus (FAO, 2012).

In both natural environments and in culture disease has a serious impact on fish. Disease is universally recognized as one of the most serious threats to the commercial success of aquaculture [4]. Parasitic diseases of fish are among these diseases which has great economic and public health importance particularly in the tropics [1]. In many cases, they have proved to be a serious problem causing economic losses in the fishing industry and in aquaculture. In fish farming, parasites may lead to epidemics and mortalities, and as the culture of fish becomes more intensive and widely spread, fish parasites infection will be more liable to become more serious economic and health issues [5]. The outbreak of fish disease is mainly related to interaction of the pathogens and environmental stress. Even though different fish species are available in various water bodies of Ethiopia, significant number of fish are not being harvested from them. One of the factors that hinder fish production is disease. More than 200 species of fish are known to occur in lakes, rivers and reservoirs in Ethiopia.

The parasites usually exist in equilibrium with their hosts as a survival strategy [6]. However, in instances where the hosts are overcrowded, such as in fish farms, parasitic diseases can spread very rapidly and cause gross mortalities losses in productivity in different water bodies and also human diseases in many areas of the world [7]. Most of human impacts on the aquatic environment also affect the health of the resident fish fauna, eventually causing disease and associated mortalities [5-8]. Parasitic diseases of fish are very common all over the world and are of particular importance in the tropics [9]. Endoparasitic infections often give an indication of the quality of the water since they increase in abundance and diversity in more polluted waters [8].

The impact exerted by parasites on host could be mechanical, chemical or physical. Effects of parasitic infection on fish are of notable importance, for instance respiratory function of the skin and gills of fish are disturbed by genera Gyrodactylus, Dactylogyrus and Argulosis infections, causing the fish to become dull, feeble, frequently swimming to water surface with erratic movement and may die of exhaustion. Metacercaria of the trematode Clinostomum marginatum are known to cause considerable damage to the viscera and musculature of many fish species both wild and cultivated (Hoffman, 1999). Ethiopia depends on its inland water bodies for fish supply for its population [2]. Despite the availability of huge potential for fish production, the country has annual consumption of 240g per person, which is the lowest in Africa. However, 10 kg per person per year achieved in areas where there is regular and sufficient supply of fish [10].

To improve the productivity of the fishery sector; important constraints remain to be addressed. One of the problems of the fishery sector in the wild population are parasites and disease conditions that reduce fish production by affecting the normal physiology of fish if left uncontrolled, it can result in mass mortalities or in some cases, can serve as a source of infection for human and other vertebrates that consumed fish [11]. From the parasites of fish Nematode, Trematode and Acanthocephala are the most economical important helminthes of parasites of fishes of the world. Most adult nematodes are found in the intestine of fish but it's the larval stages in the flesh and viscera which cause disease and economic problems. Metacercarial infection in fish is the main source of disease with subsequent economic loss [12].

However, the presence of a massive number of parasites on each fish might constitute a real threat to the fish population and should require immediate action. Since researches are the base to undertake intervention measures many studies have to be implemented in this area for the future. However, there are few reports concerning fish health in Ethiopia [7, 13, 14]. The objective of making this study in the lake Langano were therefore:

- To assess the prevalence of the parasite in the lakes.
- To asses temporal variation of internal fish parasites at lakes langano.
- To indentify economically important internal fish parasites in the lake.

Materials And Methods

Description of the Study Area

The present study was conducted at Lake Langano. Lake Langano lays just South of Bulbula town and close to Dole, East of the road Addis Abeba to Shashemene. Its geographical co-ordinates are:7036' N and 38045'S, in the Oromia region of the country. The lake has a surface area of 230 km² and is located at an altitude of 1585 m.a.sl. The total catchment area is estimated at 1600 km². The maximum depth is 46 m. The mean depth is 12 m. The maximum length and width are 23 and 16 km. The shore of the lake is 78 km long. The lake receives water from Tedemso River and several hot springs. Through the Horakalo river it flows over into lake Abyata. The landing of lake Langano are highly dominate tilapia niloticus but recently African cat fish (Clarias gariepinus), common carp (Cyprinus carpio) and mirror carp are appearing in small amounts in the total landings. The potential yield of all species of lake Langano as estimated by emperical model ranges between 3,000 to 6,600 tons per year (LFDP,1997).

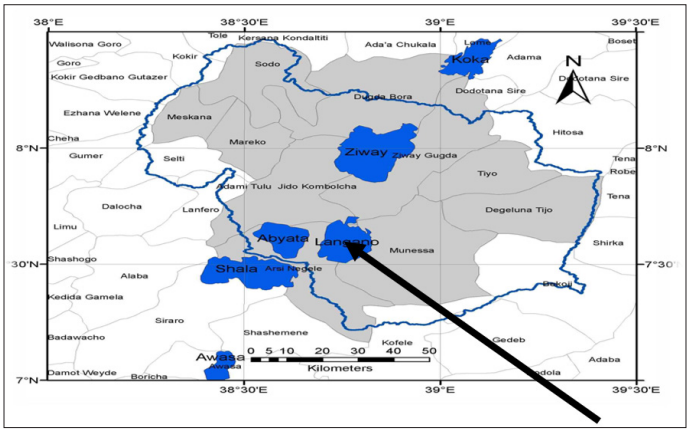


Figure 4: Map of the study area Source: LFDP, 1997

Lake Langano

Study Population

The major fish species such Tilapia (Oreochromis niloticus), Catfish (Clarias gariepinus) and common carp (Cyprinus carpio) in the lake was sampled to study the temporal variation of their major internal parasites in the lake. A total of 428 of different species of fishes were collected in 6 months (November, 2018 – April, 2019) 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. Immediately after capture, total length (TL) and total weight (TW) of each specimen was measured to the nearest 0.1 cm and 0.1gr, respectively.

The metacercarial stage of parasites and adult stages of fish parasites were collected in universal bottle and preserved in 4% formalin solution until it reaches to Ziway Fishery Research Center for laboratory examination. During the process of sampling, fish species and site of sample taken was identified and recorded. Each specimen was then dissected and the sexes of the fish were determined internally by inspecting the gonads. Regarding to the steps to collect the parasites of the fishes: -

- First open the coelom by making a ventral surface cut from the anus forward to an imaginary line at the posterior portion of the operculum. Then cut out the entire side of the coelom by cutting a rectangle of skin from behind the operculum, anterior to the anus, and ventral to the backbone.
- Secondly, Follow the digestive system from the esophagus to the anus and list the number of parasites found on different organ.
- Thirdly, cut out the small and large intestines and use a wash bottle to flush out the inside so that parasite like, tapeworms was come out the back end (annex 3).
- The parasite that was get each fish was kept in a plastic bag containing 4% formaldehyde solution. Samples were then transported to Ziway Fishery resource research Center (ZFRRC).

Study Design and Sample Size

A cross-sectional study was conducted from November 2018 to April 2019 at Lake Langano to determine the type of fish species and their parasitic infestation temporally. Then the samples were transported to the laboratory of Ziway fishery resource research center (ZFRRC). Each fish was measured (total length in cm) and weighed and their sexes were determined.

The sample size was determined by using simple random sampling method using 95% confidence interval and calculated by using the formula given by Thrusfield (2005), with 5% absolute precision and at 50% expected prevalence. But 11.46% was be added to increase the precision of the estimated prevalence of the disease. Therefore, 428 fish were collected (formula step given below) using random systematic sampling method.

N= 1.96*1.96*Pex(1-Pex)/d*d,

Therefore:

N= 384+11.46% of 384(=44).

N= 428 fish was included in the current study, where

N= required sample size

pex= expected prevalence

d= desired absolute precision

About 18 fishes per week i.e 71 per month from different areas of the lake were collected in a period from November 2015 -April 2016.

Fixation Preservation and Identification of Parasites

With regard to the technique and method that was used in fixing, preserving and identification of each parasite specimens, the appearance and procedures was used as a guideline (annex 3 and 4) [12]. Larval nematodes were fixed in 4 % formalin and later stored in the saline solution. Encapsulated larvae were carefully dissected before the tissue was fixed. Parasite Trematodes were fixed in AFA (Alcohol Formalin Acetic acid). Each parasite was collected in labeled flat bottom tubes containing the specific preservative or fixative agent. For microscopic study, Nematodes was cleared in rectophenol for 24 hours and examined under lower magnification microscopy. In the case of Trematodes diagnosis was made after being carmine stained and cleared in absolute alcohol followed by 70% alcohol.

Data Management and Statistical Analysis

Data was entered in Microsoft excel sheet and statistically analyzed using SPSS version 20. The prevalence (%) of the endoparasite was estimated as the ratio between the infected fish and the number examined fish expressed in percentages and the assessment of internal parasite by using different examination techniques. Chi-Square was used to know the prevalence of endoparasites.

Results

Overall Prevalence

A total of 428 specimens of *O niloticus* (189), *C. gariepinus* (141) and *C. Carpio* (98) were examined from lake langano. Out of these 189(80 O. niloticus, 141(107 *C. gariepinus*) and 98(61 *C. Carpio*) were infected with one or more species of metacercariae with overall prevalence rate 57.9%. The common parasites were recorded as, *Contracaecum*, *Clinostomum*, *diplostomum* and *Eustrongylides*.

Prevalence of Each Endoparasite Species Identified During Study Period

As it was observed from table 1 the prevalence of each endoparasite shows different rates in fishes that were recorded during the study period (*O niloticus* ,*C,carpio* and *C. gariepinus*).Among the three types of fishes examined of which two hundred fourty one were positive from the total (n:428) 122 of them were infected by *Contracaecum* larvae (28.5% of the total and 49.4% of the infected) while 76(17.8% of the total and 31.9% of the infected), 40 (9.34% of the total and 16.1% of the infected) and 10(2.3% of the total and 4.03% of the infected) were *Clinostomum* sp ,*Eustrongylides* and *diplostomum* respectivily. These indicates higher prevalence of *Contracaecum* parasite during study period in lake langano.

The prevalence of *Contracaecum* 43(35.24%),79(64.8%),0(0%) and *eustrongylides* sp 22(55%), 18(45%) and 0(0%) in corresponding to (*O. niloticus*, *C. gariepinus* and *C. carpio*) fishes were significant in which almost all of them were not equally infected. On the other hand the prevalence of *clinostomum* was higher in *C. Carpio* 61(80.3%) and lower in *O.niloticus* 15(19.7%) which was significant variation.as well as the prevalence of diplostomum 10(4.03%) was highest in *c.gariepinus* and lowest in others spp of fishes

Table 1: Prevalence of Each Endoparasite Recorded Among the Three Fishes Examined

Spp of parasites		Spp of fishes examined					
	No infected	*InO.niloticus%*	*C.gariepinus%*	*C.Carpio %*	Overall%	X2	P=valeu
Contracaecum	122	43(35.24%)	79(64.8%)	0(0%)	28.5	94.55	0.000
Clinostomum	76	15(19.7%)	0(0%)	61(80.3%)	17.8	175.74	0.000
Eustrongylides	40	22(55%)	18(45%)	0(0%)	9.3	13.22	0.001
diplostomum	10	0(0%)	10(4.03%)	0(0%)	2.3	20.84	0.000
Total	248	80	107	61	57.9		

Over All Prevalence in Male and Female Fishes

Sexes were assessed to observe their influence on the endoparasite infection results and the findings are presented in table (2). There was not significant variation in the overall infection for sex difference of examined animals($p>0.05$). When analyzing the infection rate of all examined endoparasites, larvae by host sex shown on table (2) 192 males examined 10(55.7%) infected, on the other hand, out of 236 females examined,131(55.5%) infected. this indicate that both sexs are equally affected.

Table 2: Prevalence of Endoparasites on Sex Base of the Host (N:428)

Sex	no examined	percent (%)	no infected	percent(%)	overall percent(%)
Male	192	44.9	107	55.7	25
Female	236	55.1	131	55.5	30.6
Total	428	100	238		55.6

X^2: =0.02 P=0.964

Prevalence of Endoparasite in Relation to Different Length

Table 3 shows that the prevalence of endoparasites in *O. niloticus*, Ccarpio and *C gariepinus* in relation to their TL (cm). Relatively highest prevalence (58.8%) was recorded at15-30cm total length of fish and the lowest endoparasites prevalence (12.2%) was observed at 31-50cm total length of fishes. And there was statistically significant variation ($p< 0.05$) was obtained between the three total body length categories.

Table 3: Prevalence of Endoparasites in *O. Niloticus C. Carpio* and *C. Gariepinus* in Relation to Their Total Length in Lake Langano

Total length (cm)	no examined (%)	no infected	percent(%)		overall (%)
15 – 30	299	69.9	140	58.8	32.7
31 – 50	44	10.3	29	12.2	6.8
51–100	85	19.9	69	28.99	16.12
Total	428	100.1	238	99.8	55.6

Overall Prevalence in Relation to Different Body Weight

It is clear from the result in table (4) that the prevalence of endoparasites in *O.niloticus* ,*C.carpio* and *C.gariepinus* examined in relation to their body weight is highest in weight class 301-1000gr (40.3 %) while lowest in class of 10-300gr (21%) Stastistically significant variation ($p: < 0.05$) was seen when the three weight catagories were tested by chi. Squere.

Table 4: Prevalence Of Endoparasites in *O. Niloticus*, *C. Carpio* and *C. Gariepinus* in Relation to Their Total Body Weight (Gr)

Total length (cm)	no examined (%)	no infected	percent(%)		overall (%)
10 _300	150	35.04	50	21	11.7
301 – 1000	156	36.44	96	40.3	22.4
1001–8000	122	28.5	92	38.7	21.5
Total	428	100	238	99.8	55.6

X^2= 51.75 P= 0.000

Overall Prevalence in Relation to Different Stage of Maturation

It is clear from the result in table (5) that the prevalence of endoparasites in O. niloticus, C. carpio and C. gariepinus examined in relation to their stage of maturation is highest in stage V (42.4 %) while lowest in stage I (5.5%). Stastistically significant variation ($p: < 0.05$) was seen when the five stages of maturation were tested by chi. Squere test.

Stageof maturation (roman number)	No. of examined	In %	No infected	In %	Overall percent(%)
I	63	14.7	13	5.5	3.04
II	67	15.65	23	9.7	5.4
III	67	15.65	36	15.12	8.4
IV	112	26.2	65	27.3	15.2
V	119	27.8	101	42.4	23.6
Total	428	100	238	100.06	55.6

X^2=85.15 P=0.000

Overall Prevalence in Relation to Temporal Variation and Abundance of Indoparsite

The prevalence of endoparasites in O. niloticus, C. carpio and C. gariepinus examined during study periods in relation to their temporal variation and abundance is highest in April (10.04%) and November (9.6 %) respectively, and lower in other monthes. Therefore, there was Stastistically significant variation (p:< 0.05) when the temporal variation and abundance were tested by chi. Squere test. On the other hand, the number of medium infected fishes spp were highest in april (43.1%) and almost equal in other months.

Table 6 shows that the prevalence of parasites in sampled fishes in relation to time variation. Relatively high prevalence (10.04%) was recorded at april and November. This is may be due to the rain fall is high in these months that make favorable condition for reproduction of hosts(snail) for the parasite to continues its life cycle and in the rest month there was slight dry the reproduction of snails was decreased.

Table 6: Temporal Distribution of Parasites from Sampled Fish

month	Noexamined	Low infestation	Medium infestation	High infestation	Overall (%)
November	72	0(0%)	25(34.7%)	16(22.5%)	9.6
December	71	0(0%)	26(36.6%)	14(19.7%)	9.34
January	71	23(32,4%)	15(21.1%)	0(0%)	8.9
Febrary	71	14(19,7%)	22(30.9%)	0(0%)	8.4
March	71	0(0%)	29(40.8%)	11(15.5%)	9.34
April	72	0(0%)	31(43.1%)	12(16.6%)	10.04
Total	428	37	148	53	55.62

X^2=115.24 p=0.000

Discussion

Fish internal parasites are generally found in all freshwater fishes and its prevalence varies among different water bodies which may depend on many factors like parasite and its life cycle, host and its feeding habits and the physical and chemical (salinity, pollutants) factors of water body where the fish inhabit. The present study revealed that the prevalence (57.9%)of endoparasite in O.niloticus, C.carpio and C. gariepinus in lake langano was lower than the previous reports of 75.67% at Lake Hawassa, 73.24% , 58% at Lake Hawassa and higher than the previous reports of 48.12% at Lake Tana.The variation of prevalence rate in the same lake might be, temporal variation of the area and dynamic nature of parasitism and the variation between 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 they established in the mouth and pharynx of these piscivorous birds [13-16].

It is likely that a large population of piscivorous birds around the lake harbor the adult parasites. Eustrongylides and Contracaecum species that infect freshwater fish are usually found as adults in fish-eating birds, such as cormorants and pelicans. Larval stages are seen in cyprinids (carp and related species), ictalurids (channel catfish), centrarchids (sunfish and bass), tilapia and other cichlids, and percids (perch) [17].

Reported that, Clinostomum marginatum, Eustrongylides sp. and Contracaecum sp. were found parasitizing Oreochromis niloticus, which was agrees with this finding.Nematode parasites were found in the intestines of the fish host as earlier observed by, who recorded nematode as the most common parasites infecting 18.6% of the fish population [18,19]. Infection by contracaecum and clinostomum species have been reported in O. niloticus from the lake Ziway with the prevalence of 28% which was Similar with the present study [20]. Prevalence of Contracaecum and Clinostomum sp (25.9%) from different Iraq water bodies was reported by which was also similar with this study (ie 28.5&17.8%) [21]. Eustrongylides was the other type of parasite recovered during the study period, with an overall prevalence of 9.3% which was comparetivily different from (1.2%) from paperna (1991).

Diplostomum was the fourth parasite spp that was identified during study period in the brain (cranial cavity) and in the eye of C. gariepinus at sytudy area with prevalence of 2.3% in studied spp of fish that agreed with the prevalence of 4% in This species wich was 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.

There was no significant ($p > 0.05$) difference between the infection of males and females in pervalence of infection during study period. this is may be due to that in their life cycle the parasites are not prefere the sexs of host to complete their life cycle. But this the findings are in contrast to the finding of (Ochieng et al., 2012) that male fishes were generally more susceptible than female to infections with nematodes, trematodes, acanthocephalan, crustacean and copepod parasites. This phenomenon is still unclear but can be associated with the breeding habit of the fishes. During breeding, male fish takes care of a territory around the nest, keeping off other fish (females not spawning included).

During this period the males spend more time than the females in the shallow waters where the snails harboring the cercaria of Clinostomum, Contracaecum, Eustrongylides and other internal parasitesare mostly found, and this is probably why the males had higher prevalence than females.

The prevalence of infection was positively correlated with host length. This means that as fish grows, chances of infection increase for these parasites, because a long period of exposition to infective stages, and the amount of food it consumes, which including the larval stages of this parasite increased. This observation was similar with (Mashego, 1989 and Rohde, 1993), as they reported, larger fish have lived longer (as fish grow during all their life) and, therefore, have a higher probability of encountering parasites during their life span than smaller and shorter-lived fish species. Also, in this study shorter fish are more infected, this is may be due to the less immunity to resist the infection by the pathogens.

Moreover, feeding habits and wide diet put fish into contact with potential intermediate hosts of nematodes, cestodes, digenea, and acanthocephalan. Aho and Bush (1993) stated that the parasite species might accumulate among food chains; this could be particularly the case for endo-parasites. Szalai and Dick (1990) mentioned that the Contracaecum spp. larvae were absent in younger age of bass (Micropterus salmoides) but prevalence and mean intensity increased with age, for bass age 2 year or older. Poulin (2006) stated that the increase in prevalence and intensity with the host length, could be related, not only to accumulation of parasites in the host during its life, but also to change of diet. According to Luque and Alves (2001), correlation between the host total length and parasite prevalence and intensity is a pattern widely recorded in marine fish and documented with numerous cases in freshwater and marine fishes, also indicates higher parasitic infestation in C. gariepinus with the ranges 30-70cm in which they feed on large juvenile fish and crustacean parasites which also similar with this study.That means infection level increase significantly with size.of the host [17].

The relationship between the body weight and the overall prevalence of endoparasite was calculated. The result showed that the prevalence significantly, highest, higther and lower in body weight groups of 301-1000gr (40.1%) 1001 _8000 gr (38.7 %) and10-300gr (21%), respectivily when it was observed within the weight classes and the overall prevalence of 22.4,21.5, and 11.7, respectivily when it was observed from the total (428) examined animals.

The prevalence of endoparasite in relation to time variation at studied area is 9.6 % and 10.04% which is different from the previous result of at lake ziway, with the prevalence of 28% in the same months (November&april) respectively [20].

The higher prevalence of internal helminth parasites in the present study was ascribed to different factors which include absence of proper waste disposal and management system in which the fishes were processed and the waste (scraps and gastrointestinal contents) was dumped in to the Lake Shoreline, traditional ways of fishing which damaged the phytoplankton or zooplankton of the Lake (feed/weed) that enhanced competition for feed and the use of small sized fish nets which trapped the fingerlings and juveniles and environmental pollutions (climate change) and stress caused from the surrounding and increament of dog population that fed on row fish after slaughter,and they may transmit larval stage of the parasites.

Conclusion and Recommendation

in many fish health assessments, the role of parasites on fish health cannot be ignored. They are generally a source of concern when it affects the fish species of popularity, or causing harmful effects on the economy or recreational activities, or commercial fisheries.

Prevalence of endoparasites in O. niloticus, C. carpio and C. gariepinus in lake langano was Slightly lower (57.9%) than the previous reports from different lakes. There were significant variations in parasite types that infectes O. niloticus, C. carpio andC. gariepinus fishes. four helminths (Contracaecun, Clinostomum, Eustrongylida nddiplostomum) were identified in three fishes in this study. No Sex preference was observed in the prevalence of the parasite. The prevalence of infection was positively correlated with host length and weight. This means that as fish grows, chances of infection increase for these parasites in this finding.

The prevalence of infection also positively related with stage of maturation of fish in this study. this means that as the stage of maturation of fish increase chance of infection of the fish by these parasite increase. The prevalence of these parasites various in relation to time, that is the higher prevalence was observed during high humidity of the year

Hence, based on the findings of the current study, the following points are recommended: -

- Further studies are needed on other existing parasites and bacterias in the lake to provide for more comparative study.
- Identification of the genera Contracaecum, Eustrongylide, diplostomum and Clinostomum, to the species level is important to check for the occurrence of zoonotic parasites.
- The study of these parasites and others should be coupled with molecular biology to enable a more accurate description of their diversity and occurrences.
- 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.
- Eating row or un cooked fish meat should be prohibited to control zoonotic diseases of fish
- Proper waste and offal disposal method should be implemented to avoid the existing contamination of the lake; to break the life cycle of parasites of fish and an effective parasite control program should be incorporated in the management of the lake.
- Stray dog arruond the lake should be controled
- Fish habitat should be protected from chemicals and pollutants that was harmiful for fishes [22-64]

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