



Review on distribution of endo-parasites of fish in Ethiopia



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ABSTRACT

Recently the government of Ethiopia paid great attention to livestock and fish production sectors of the country. As evidence, the sector is organized in the form of ministry, Ethiopian Ministry of Livestock and Fisheries. This is great progress in the history of the country. These and other focuses given to the sector are expected to dramatically change the eating habit of the community towards fish meat as well as fish production trends of the country. However; parasitic diseases of fish are great challenges in the processes of fish production in Ethiopia and hence, the primary goal of this paper is to compile all available information concerning distribution of endo-parasites of fish in the country and provide the necessary information for policy makers, investors and researchers interested in the field. In line with the objective of this paper, there are many reports on helminth endo-parasites of fish in Ethiopia reported by different authors with different prevalence's from different corners of the country. Digenean trematodes, nematodes and cestodes are the major endo-parasites reported from the different water bodies of the country. To mention some of the major species of parasites affecting different species of fish are: *Clinostomum* and *Euclinostomum* species of trematodes, *Contracaecum* and *Eustrongylides* species of nematodes and *Ligula intestinalis* and *Proteocephalus* species of cestodes mainly affecting: *Clarias gariepinus*, *Oreochromis niloticus*, *Barbus* and *Cyprinus carpio* species of fish. Most reports showed that fish Endo-parasite are more prevalent in Ethiopia in Lake Awassa, Lake Lugo (Hayke) and Lake Tana. In conclusion, endo-parasites of fish are highly prevalent in different water bodies of Ethiopia. Therefore, there should be a nationwide strategy in prevention and control of endo-parasites of fish, and further study on the economic and public health impact of these parasites should be studied.

1. Introduction

Ethiopia depends on its inland water bodies for fish supply for its population. The country has a surface area estimated at 7334 Km² of major lakes and reservoirs and 275 Km² of small water bodies with 7185 Km of rivers within the country (FAO, 2003). Several of these water bodies serve as sources of fish for the country. Fish production system in Ethiopia is mainly fish catch type but there are very limited recent developments in fish farming. In all production systems, subsistence and artisanal fisheries are predominantly practiced (FAO, 2015). Exceptional to this are Lake Tana, Lake Lugo, Lake Chamo, Lake Awassa and Lake Ziway which are widely commercialized (Janko, 2014).

Recently, the data of Ministry of Agriculture and Rural Development (MoARD, 2011) stated that the total catch of fishes increase from 14,000 in 1998 to 24,257 tons in year 2011. Since then, there was a plan to raise the annual fish production to over 65,000 tons per year. To achieve the plan, there are new constructions of reservoirs and dams throughout the country, to mention some of them:

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Tendaho reservoir, Tekeze dam, Gilgel Gibe-I, II and III dam, and also the great renaissance dam (Ward and Wakayo in *ACP Fish II*, 2013; Abebe et al., 2015; <http://ethpress.gov.et/herald/index.php/editorial-view-point/item/7729-the-reality-of-the-gerd>). These newly constructed reservoirs and dams are stocked by highly productive imported or locally selected fish breeds (FAO, 2014). There are also emerging commercial river fisheries and aquacultures in some parts of the country (MoARD, 2011). According to Abraham (2005), the annual fish demand in Ethiopia in the year before 2005 was 65,544 tons which is equivalent to 1 kg per person.

In Ethiopia, there are about 168 to 183 different species of fish and 37–57 of them are native to the country (Golubtsov and Mina, 2003). The most common and commercialized fish species in Ethiopia are: *Oreochromis niloticus*, *Clarias gariepinus*, *Lates* species, *Barbus* species and *Bagrus* species (Shibru, 1973; Tudorancea et al., 1999). The annual fish production potential of the country was estimated based on empirical methods on individual lake surface area and mean depth of major water bodies and was estimated to be 30,000 to 51,000 tons (FAO, 2003). Despite the presence of huge volume of water bodies in the country, its contribution to the national economy is marginal (contribute only 0.02% of the overall GDP of the country) mainly due to manmade and environmental constraints (Amare, 1986; Mwanja et al., 2011; FAO, 2015). To mention few, out of the several factors affecting fish production in Ethiopia are poor management systems, pollution, traditional fish production techniques, presence of limited trained human resource and inadequate legal and policy frameworks (FAO, 2015). Furthermore, factories, agriculture and sewage are the sources of major pollutants affecting Ethiopian water bodies and their fisheries (FAO, 2014).

Currently, despite the availability of huge potential for fish production, the country has annual consumption of 240 g per person in some parts of the country, which is significantly below the mean 2.6 kg per capita per year for the East African sub-region. However; 10 kg per person per year achieved in areas where there is regular and sufficient supply of fish (MOA, 2002).

Despite there is high demand of fish production in the country, fish farms are vulnerable to great hazards exerted by parasites and other disease causing agents, especially under extensive fish production system with poor management and insufficient control measures (Bauer et al., 1969). There are very limited studies concerning economic and public health impact of endo-parasites in Ethiopia.

According to Lemma (2013), many fish diseases are causing huge mortality both in aquaculture and capture fisheries and some are also causing for human diseases in many areas of the world. The author mentioned that parasitic cases are very common in Ethiopia and most parasitic organisms are opportunistic and may be present all the time in the tank or on the fish in low numbers, and only cause disease when the fish is stressed. Several authors also added that some of the detrimental effects of parasites in fish production are causing fish diseases and hence causing mass mortalities, increase farm inputs via increased treatment expenses and cause reduction in growth rate and weight loss during and after the period of parasitic disease outbreak and spoil the appearance of fish and hence lowers the quality and quantity of fish thus resulting in consumer rejection and affect marketability of commercially produced fish in different parts of the country (Eshetu and Muluaalem, 2003; Kaddumukasa et al., 2006; Ayotunde et al., 2007; Kayis et al., 2009; Gulelat et al., 2013). This disturbs the balance between fish supply and demand. Furthermore, poor environmental conditions and pollution often result in reduced immunity of fish and increased susceptibility to parasitic infections and/or infestations and parasitic diseases (Luque and Poulin, 2004). For example, according to a study conducted in Ethiopia by Lemma (2013), most parasitic diseases occur as a result of poor water quality. In Ethiopia, there are fragmented reports concerning fish endo-parasites. Such fragmented reports are not easily accessible and palatable to policy makers and researchers. Therefore, the objective of this paper is:

- ✓ To review and compile the distribution of endo-parasites of fish in Ethiopia so as to provide policy makers, investors and researchers with the necessary information that enables them to develop appropriate strategy to mitigate the problem

2. Literature review

Endoparasites of fish found in Ethiopia belong to two phyla: Platyhelminthes with the classes Trematoda (flukes) and Cestoda (tapeworms), Nematoda, Zootaxa 1668: 265–293 and one phylogenetic clade known as Syndermata which comprises the sub-taxon Acanthocephala and Totatoria (Rotifera) (Urquhart et al., 1996; Herlyn et al., 2003; Hodda, 2007). Flukes, tapeworms, nematodes and acanthocephalans infect the internal organs of fish with their intermediate stages (Larvae) and sometimes encysting in various host tissues or most adults mainly affect the digestive systems of their hosts but few the circulatory systems (Woo, 1995; Luque and Poulin, 2004; Roy, 2006; Kirk, 2012). In general, endo-parasites of fish affect fishes negatively in several ways and poses a potential threat to the sustainability of fisheries (Paperna, 1996). Furthermore, endo-parasites with heteroxenous nature in particular are more complex and known to cause huge economic loss in aquaculture warm water fish farming systems (Paperna, 1991).

2.1. Trematodes

Trematodes are commonly referred to as flukes and comprise two sub-classes: Aspidogastrea and Digenea. Members of the Aspidogastrea comprise small groups of parasitic species of trematodes affecting molluscs, fishes and chelonians. These groups of parasites are characterized by having ventral holdfast (attachment organ) which covers most of ventral surface of their body and subdivided by arrangement of loculi (called alveoli or rugae) or rarely, into longitudinal rows of separate suckers. The Digenea are a much larger group, the vast majority of which use molluscs as primary hosts and vertebrates as final hosts and characterized with their ventral attachment organ as a sucker which is not normally covering more than half of ventral surface of the body and not subdivided into alveoli (Roberts and Janovy, 2000). According to Khalil (1971), 50 species of trematodes were listed from 15 families which all occur in freshwater fish in Africa. In Ethiopia, different genera and species of flukes were reported by several authors from

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