

Prevalence of bovine schistosomosis in fogera district

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Abstract: A cross-sectional study was conducted from February 2019 to April 2020 in Fogera district to determine the prevalence of *bovine Schistosomosis*. Schistosomosis in cattle is one of the well known parasitic diseases locally referred to as “Yeweha till” meaning water-borne worm infection. From the total of 430 cattle examined using coproscopical examination in the field survey 27.9% (n= 120) were found to be positive for *schistosoma bovis*. Of the total 80 cattle examined in the abattoir, 12.5% (n=10) were positive for schistosoma adult female and male worms during postmortem finding but only 6.25% (n=5) of them were found positive schistosoma eggs using coproscopical examination. The prevalence of schistosomosis was found also higher in local cattle (23.49%) than that of Fogera (6.04%) and cross-bred cattle (Local X Fogera) (4.42%). The prevalence of the disease was higher in age group of cattle above 5 years of age (15.8%) than that of age groups between 1.5 to 5 years (10%) and below 1.5 years (2.09%). The prevalence of bovine Schistosomosis in female cattle (14.90 %) was found greater than that of male (13.02%). The present study was carried out on bovine schistosomosis in Fogera district has the objectives of to provide detailed information of cattle Schistosomosis, to determine the prevalence of bovine schistosomosis according to sex, age and breed of cattle and to determine the prevalence of bovine schistosomosis in slaughtered animals.

Keywords: Prevalence, *Schistosoma bovis*, Fogera, Ethiopia

1. Introduction

Schistosomosis (blood fluke disease or bilharzosis) is an infection due to the genus schistsoma.

Although this parasite occur in many tropical and subtropical areas, the disease is important in livestock mainly in Easter Asia, Africa and India [1, 2]. Adult Schistosomes are obligate parasite of the blood vascular system of vertebrates. Schistosomes are dioecious (unisexual) worms, which is an exception among the trematodes [3, 4].

Visceral Schistosomes mature in the hepatic portal veins, mate and migrate to the mesenteric veins where egg production starts [3]. The female in the mesenteric vein insert her tail in to the venule. The eggs penetrate the venule endothelium aided by their spines and by proteolytic enzymes secreted by the unhatched miracidia [5, 7]. Egg lay by the female worm penetrate the wall of the veins and migrate to the intestinal lumen or the nasal cavity. (*S.nasale*) of the host are retained inside the body and it is the retained eggs and their products that responsible for most morbidity from Schistosomosis [8].

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In addition to the high prevalence rate and outbreak of the disease, it has an economic impact like production losses due to *S.bovis* result from mortality, delayed growth, partial liver condemnation and poor future reproduction performance and sub clinical infections cause significant losses due to long term effects on animal growth and productive capacity or milk yield, draft power and increase susceptibility to other parasitic or bacterial disease [9, 10]. In humans' economic losses in terms of working hours has been shown [11].

A form of cutaneous larva migrants often called "swimmers itch" (cercarial dermatitis) occurs in man and Schistosomes which have a limited migration in human skin [7, 12]. Migratory water fowl frequently harbor schistosomes (blood flukes) in their blood vasculature. These schistosomes produce eggs that pass in the bird's feces to the water environment. The eggs hatch, producing miracidia, which turn penetrate a aquatic snails with the snail, the miracidium undergo asexual reproduction and produce thousands of cercariae these cercariae exit the snail hope fully to penetrate the definitive host, the migratory water fowl [6, 12]. Humans serve as incidental hosts for these avian schistosomes. During the swimmer months, people swim or wade in the lakes, ponds, rivers and even ocean waters frequented by the wild birds.

In Ethiopia, reports on animal schistosomes are very scanty and until recently it has been considered as an occasional finding in slaughter house and postmortem examinations [13]. It has been reported that *S.bovis* is the only species reported with localized distribution in ten out of fourteen administrative regions in the country [14, 15]. Detailed information on prevalence and intensity of infection of *S.bovis* in Ethiopia and various factors, which influence the host parasite relationship, are generally lacking. The present study was carried out on bovine schistosomosis in Fogera district with the following objectives;

- To provide detailed information of cattle Schistosomosis.
- To determine the prevalence of bovine schistosomosis according to sex, age and breed of cattle.
- To determine the prevalence of bovine schistosomosis in slaughtered animals in abattoirs.

2. Materials and methods

2.1 The Study Area

The study was conducted from February 2019 to April 2020 in Fogera area. The study area is located 1800 to 2000 m a.s.l with elevation of the area is feature predominantly moderate Woynadega temperate high land Dega climates. The land scope is marked by the present of Lake Tana in adjacent side which drains of water shed about 3000km² and surrounded by High Mountain with plains slopping patches of land near the shore line. The area has a summer rain fall with mean annual rain fall and mean annual temperature of 1600 mm and 20°C respectively.

The rich agricultural land of the area supports a large livestock population, water and grazing pastures being abundant for months of the year, but due to periodical flooding during rainy season, cattle have to move to the hill side.

2.2 Animals and management

The dominant cattle breed in this region is local indigenous Fogera cattle. In the study area both traditional and modern (semi-intensive) livestock farming are practiced. In the traditional management system animals are often kept out-doors and grazed all day near the vicinity of the Lake Tana. These grazing areas

are potential sources of schistosome infection due to the frequent contact of animals to the water bodies. In the semi-intensive management system, cattle are kept in-doors and partly out-door. While indoors, they are supplemented with adequate qualities of feed and clean water. Their management of outdoors is similar to the traditional extensive farming type.

2.3 Study population

The sampling units of the study were local and cross breed cattle. A total of 430 cattle were considered in this study for coproscopical examination and were registered according to their breed, sex and age. The age of the study animals was determined by dental eruption formula which involves counting number of permanent incisors [3, 6, 16]. The group of age of animals are Group I: $0 \leq X < 1.5$ years, Group II: $1.5 \leq X \leq 5$ years and Group III > 5 years.

2.4 Study Design

A cross sectional study was conducted to determine the prevalence of *bovine Schistosomosis*. The desired sample size was calculated using the formula given by Thrusfield [17]. 263 cattle were selected using random systematic sampling method to estimated prevalence of the disease. However, due to low number of positive animals at the beginning of the study, the sample size was increased to 430 cattle.

2.5 Study Methodology

2.5.1 Coproscopical Examination

The purpose of coproscopical examination was to determine the presence or absence of schistosoma egg in the feces. Fresh fecal samples were directly collected from rectum of 516 animals and preserved with 10% formalin in a universal bottle to prevent hatching of miracidia then after sedimentation procedure was done till the sediment of the fecal sample become clear. Following these all procedures the prepared sample observed under low power microscope in the laboratory [18].

2.5.2 Post -mortem Examination

The fecal sample were collected during antemortem examination with universal bottles and labeled to examine the same animals during post mortem time. At post mortem examination the liver, portal vein, mesenteric vein were observed and incised to find the adult schistosomes and also the whole root of intestine were examined superficially to appreciate the presence of lesions and dead parasites at the junction of the tip of the vein and the wall, serosa and subserosa of the intestine [7].

2.6. Statistical Analysis

The sample size of the field survey were classified in to three parameters breed, sex, and age then the data was managed by using SPSS (17 version) program and the prevalence between the parameters was analyzed using chi-square (χ^2) test and binary logistic analysis. While the comparison between post mortem finding and fecal examination was handled by using simple prevalence rate.

3. Results

3.1. Overall Prevalence

From the total of 430 cattle examined using coproscopical examination in the field survey 27.9% (n=120) were found to be positive for *schistosoma bovis*. Of the total 80 cattle examined in the abattoir, 12.5% (n=10) were positive for shistosoma adult female and male worms during postmortem finding but only 6.25% (n=5) of them were found positive schistosoma eggs using coproscopical examination.

Table 1 Infection prevalence of bovine Schistosomosis in different breeds, sex and age groups of Fogera district.

Animals		Total number of Animals examined	Number of positive Animals	Preva- lence (%)
Breed	Local	211	75	17.44
	Fogera	145	26	6.04
	Cross	74	19	4.42
Age group	I	52	9	2.09
	II	154	43	10
	III	224	68	15.8
Sex	Male	182	56	13.02
	Female	248	64	14.9
Total		430	120	27.9

The prevalence of schistosomosis was found also higher in local cattle (23.49%) than that of Fogera (6.04%) and cross-bred cattle (Local X Fogera) (4.42%). The prevalence of the disease was higher in age group of cattle above 5 years of age (15.8%) than that of age groups between 1.5 to 5 years (10%) and below 1.5 years (2.09%). The prevalence of bovine Schistosomosis in female cattle (14.90 %) was found greater than that of male (13.02%).

3.2. Abattoir survey

From the total of 80 male cattle slaughtered at Wereta Municipal Abattoir, the purpose of this survey was to compare the prevalence difference between post mortem finding and coproscopic examination. During post mortem *Schistosoma bovis* was found in the mesenteric, portal veins were examined and incised. 12.5% (n= 10) were found to be positive but only 6.25% (n= 5) of the 80 cattle were positive in coproscopic examination.

4. Discussion

Schistosomosis in cattle is one of the well known parasitic diseases locally referred to as "Yeweha till" meaning water-borne worm infection. As well as most of the slaughtering practice took place in backyard slaughtering system so that the dumping of the stomach and intestinal contents, including the blood and

washed material nearby water bodies (rivers, irrigation canals, ponds e.t.c) can create an easy access to the snail intermediate to the egg of schistosoma from such materials. This practice together with contamination of water bodies with manure and defecates, as in case in some areas where there is poor watering facilities, could highly contribute to the spread of the disease in surrounding at large, in addition to the above problem the koladiba municipal abattoir itself has got hygienic problem that will contribute for the occurrence of the disease.

The overall prevalence of *S. bovis* infection 27.9% in the study area was found lower than the previous studies in which prevalence rate around Bahir Dar were 33.8% [19] and 34% [20]. The lower prevalence of schistosomosis recorded in this study may be due to the fact that trematodes are intermittent egg layers so that the chance of detecting eggs by fecal examination may be minimal. In addition to this not all schistosoma eggs are excreted in the faeces, many of them may be trapped tissue [21]. Moreover, the number of adult parasite established in the mesenteric veins and the stages of infection may determine fecal egg output thus, postmortem examination is more specific to detected schistosoma infection than coproscopical examination.

The prevalence of *Bovine Schistosomosis* was found higher in local cattle (17.44%) that of Fogera (6.04%) and cross-bred cattle (Local X Fogera) (4.42%). This finding is not in line with other reports in which the prevalence of bovine schistosomosis higher in crosses cattle than local cattle [15, 20]. The reason for this difference in prevalence rate between breeds may be due to the cross breeds are mostly indoored for fattening or dairy purpose by supplementing good feed and clean water so that they cannot get access to the miracidium; while the local once are mostly released extensively to graze freely and then they will get acquired immunity through long time exposure the above statement also related with research paper that was done in Sudan which suggests that Sudanese cattle were apparently acquired immunity to *S. bovis* as a result of repeated exposure [22].

The prevalence of schistosomosis in this study which was higher in age group of cattle greater than 5 years than that of 1.5 to 5 years and below 1.5 years of age. This finding is not in line with other reports [15, 20] around Bahir Dar .The lower prevalence (2.09%) in age group I cattle may be due to the fact that most calves are kept indoors hence have low chance to cercariae exposure.

The higher prevalence of schistosomosis in this study in female cattle than male cattle is not in line with the previous study [15] in Bahir Dar .The reason for the higher prevalence in female than that of male in cattle is that cows were in stress of lactation and pregnancy even though the two sexes are equally exposed to the disease because they graze at the same time in the same place [23].

In the postmortem examination of slaughtered animals to determine the adult Schistosome worms from portal veins were examined and incised. 12.5% (n= 10) were found to be positive but only 6.25% (n= 5) of the 80 cattle were positive in coproscopical examination. The reason for this difference in prevalence of schistosomosis between abattoir survey and coproscopical examination may be due the fact that trematodes are intermittent egg layers which are dependent on the age of animal [3].

5. Conclusion and recommendations

Bovine Schistosomosis is one of the endemic disease condition in the study area that deserve serious attention in the future even though there has been little recognition of its veterinary significance, cattle Schistosomosis does cause significant loss through out the world. This is due to the nature of the disease, which usually occurs at sub clinical level with long term effect on animal growth and productivity and increase susceptibility to other parasitic or bacterial diseases. It is, therefore, important to obtain more information on natural schistosomes' infection in cattle in general, and on the evaluation of the host-parasite relationship

under condition of challenge in particular. Despite the fact that there was no significant difference between male and female cattle, it should be allowed to graze the cattle at the same time and the same place to avoid transmission in between because females give a high economic value as compared to males.

Based on this study, the following recommendations are forwarded.

✓ Schistosomosis should be taken in to consideration as a one of the major limiting factor to livestock productivity in Fogera District; hence any Endeavour towards animal disease control strategy must include it in the priority list.

✓ Further detailed studies are needed to gather a rich database both on the parasite and its vector, which will be useful to envisage a cost effective and sound Schistosomosis control measure in the area.

✓ Farmers should get educated about the transmission of the disease at least to tell them not to let their cattle freely in swampy area and supply dry feeds sometimes.

✓ Cross breeds should be kept indoors and supplying of clean water should be performed to prevent infection as they are highly sensitive to the disease. And also different ages and breed groups should not graze together.

✓ Available means in snail control and disease monitoring could be implemented as a short term activity. Indigenous knowledge deserves investigation in this regard. The native Ethiopian plant phytoplanka dodecandora, locally known as Endod which is considered as potent molluscicide for the control of human Schistosomosis, could also be effectively used against intermediate host of *S. bovis*.

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