

The Prevalence of Bovine Shistosomiasis in Dembia Woreda, Ethiopia

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Abstract: A cross-sectional study was conducted from November 2009 to March 2010 in Dembia district, northwest Ethiopia to determine the prevalence of bovine Schistosomosis. The study was conducted on coproscopical and abattoir examination. A total of 516 cattle were examined for coproscopical examination. Out of 516 cattle 27.13% (n=140) were found positive for *Schistosoma bovis* (*S. bovis*) on coproscopic examination. The prevalence of Schistosomosis was found also higher in local cattle (29.70%) than that of cross-bred cattle (Local X Holstein-Friesian) (17.10%). There was statistically significant difference ($\chi^2=6.65$, $p=0.01$) between the two breeds. The prevalence of the disease was higher in age group of cattle between 2 to 5 years of age (30.10%) than that of age groups above 5 years (27.80%) and below 2 years (17.60%). However, no any significance difference ($\chi^2=4.28$, $p=0.12$) among age groups. The prevalence of bovine Schistosomosis in female cattle (30.70%) was found greater than that of male (23.30%). There was also no significance difference ($\chi^2=3.59$, $p=0.06$) between the two sex groups. Analysis of the study variables using binary logistic analysis indicated that only breed have significant effects on prevalence of bovine schistosomosis in the study area. The chance of schistosomosis infection in local cattle was found more than six times (OR=6.65) than that of cross-breed cattle. In the second part of the study 100 cattle were slaughtered at Koladiba Municipal Abattoir and examined using postmortem examination for adult schistoma worms, of these 30% (n=30) were found harbored schistosomosis adult worms in their mesenteric, portal and pancreatic veins as well as in intestinal serosa and sub serosa. However, only 12 % (n=12) of them were positive for schistosoma eggs using Coproscopical examination. Schistosomosis should be taken in to consideration as a one of the major limiting factor to livestock productivity in Dembia district; hence any endeavour towards animal disease control strategy must include it in the priority list.

Key words: Prevalence • *Schistosoma bovis* • Coproscopic Examination • Dembia • Ethiopia

INTRODUCTION

Schistosomosis is an infection due to trematodes of the genus schistosoma. Although these parasites occur in many tropical and subtropical areas, the disease is important in livestock mainly in Eastern Asia, Africa and India. Schistosomosis is one of the major diseases of man in the tropics [1, 2]. Other names given to schistosomosis are blood fluke disease and bilharzosis [3]. The schistosomes are different from most other members of the Digenea in that their sexes are separate. The term schistosome or schistosoma means split body and refers to the fact that the males have a ventral groove called a gynaecophoric canal [4, 5]. As parasites of humans or other animals, the blood flukes lie in venules, usually in the lower abdomen, where they copulate and the female lay eggs which reach the outside in either feces

or urine. There is only a single intermediate host, a snail and the forked-tailed cercariae (forko-cercaria) reach the definitive host by actively penetrating the broken skin [5-8].

The blood flukes are not only very important primarily as a cause of human disease in many tropical and sub tropical areas of the world, but also considered as economically important parasites of cattle and other large domestic animals [5]. Epidemiological studies conducted on bovine schistosomosis indicated that in bovine species it is a serious disease problem in some areas of the country like Gewene, Awassa and Bahir Dar and the prevalence was found 1.5% and 5.5% as noted by Lo and Lemma [9], respectively. In other studies around Bahir Dar 33.8%, 12.3%, 34%, 17.4% and 22.06% prevalence was indicated by Solomon [10], Aemro [11], Hailu [12], Yalelet [13] and Solomon [14] respectively.

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 [15]. 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 [9-10, 16]. 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 bovine schistosomosis in Dembia district which is located in the north cost of Lake Tana with the following objectives; (1) to determine the prevalence of bovine schistosomosis according to sex, age and breed of cattle and (2) to determine the prevalence of bovine schistosomosis in slaughtered animals in abattoirs.

MATERIALS AND METHODS

The Study Area: The study was conducted in Dembia area which covers a total of 203,153 hectare of land. The study area is located 1800 to 2000 m. a.s.l. The land scope is marked by the presence of Lake Tana in adjacent side which drains water shed of 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 1600mm 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.

Study Population: The sampling units of the study were local and cross breed cattle. A total of 516 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 [17-19].

The study animals were grouped based on age designated as follows:

Group I: 0=X< 2 years

Group II: 2=X =5 years

Group III: >5 years

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 [20]. With 95% confidence level, 5% desired absolute precision and 22.06% prevalence Solomon [14] study 263 cattle were selected using random sampling method to estimate prevalence of the disease. However, due to low number of positive animals at the beginning of the study, the sample size was increased to 516 cattle.

Study Methodology

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 a rectum of 516 cattle and preserved with 10% formalin in a universal bottle to prevent hatching of miracidia and then after sedimentation procedure was done till the sediment of the fecal sample become clear. Following these all procedures, the prepared sample was observed under low power microscope in the laboratory [21].

Post -Mortem Examination: The fecal sample were collected during antemortem examination with universal bottles and labeled to examine the same animals during postmortem time. At postmortem examination the liver, portal vein, mesenteric vein where 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 [22].

Data Analysis: The sample size of the field survey were classified in to three parameters: breed, sex and age and 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. The Odds Ratio (OR) was calculated for variables which have significance differences. A significance level was set to determine the presence or absence of statically significance difference between given parameters. While the comparison between postmortem finding and fecal examination was handled by using simple prevalence rate.

RESULTS

Overall Prevalence: From the total of 516 cattle examined using coproscopical examination in the field survey 27.13% (n= 140) were found to be positive for *schistosoma bovis*. Of the total 100 cattle examined in the abattoir, 30% (n=30) were positive for shistosoma adult female

Table 1: Infection prevalence of bovine Schistosomosis in different breeds, sex and age groups of cattle in Dembia area

Animals	Total number of Animals examined	Number of positive Animals	Prevalence (%)	p-value
Breed				
Local	411	122	29.70	0.01
Cross	105	18	17.10	
Age group				
I	74	13	17.60	0.12
II	176	53	30.10	
III	266	74	27.80	
Sex				
Male	249	58	23.30	0.06
Female	267	82	30.70	
Total	516	140	27.13	

and male worms during postmortem finding, but only 12% (n=12) of them were found positive for schistosoma eggs using coproscopical examination.

Breed-Specific Prevalence: The prevalence of schistosomosis was found also higher in local cattle (29.70%) than that of cross-breed cattle (Local X Holstein-Friesian) (17.10%). There was also statistically significant difference ($\chi^2=6.65$, $p=0.01$) between the two breeds (Table 1).

Age-Specific Prevalence: The prevalence of the disease was higher in age group of cattle above 2 years and bellow 5 years of age (30.10%) than that of age groups above 5 years (27.80%) and below 2 years (17.60%). However, no any significance difference ($\chi^2=4.28$, $p=0.12$) among age groups (Table 1).

Sex-Specific Prevalence: The prevalence of bovine Schistosomosis in female cattle (30.70 %) was found greater than that of male (23.30%). There was also no significance difference ($\chi^2=3.59$, $p=0.06$) between the two sex groups (Table 1).

Analysis of the study variables using binary logistic analysis indicated that only breed has significant effects on prevalence of bovine schistosomosis in the study area. The chance of schistosomosis infection in local cattle was found more than six times (OR=6.65) than that of cross-breed cattle.

Abattoir Survey: From the total of 100 male cattle slaughtered at Kolladiba Municipal Abattoir, this survey was made to compare the prevalence difference between post mortem finding and coproscopic examination. During postmortem examination *Schistosoma bovis* was found in the mesenteric, portal veins were examined and

incised. 30% (n= 30) were found to be positive, but only 12% (n= 12) of the 100 cattle were positive in coproscopic examination.

DISCUSSION

Schistosomosis in cattle is one of the well known parasitic diseases locally referred to as ‘*Yeweha till*’ meaning water-borne worm infection. Most infections occur at subclinical level that cause significant loss due to long term effects on animal growth, productivity and increase susceptibility to other parasitic and bacterial diseases [23, 24]. Although high infection rate was found in cattle with prevalence of 33.8% by Solomon [10] and 34% by Hailu [12] in previous studies and the same happens in this study (27.13%) prevalence was found, which is due to the reason that most of the surrounding area of Dembia have wide swampy pasture land that create an appropriate environment for the intermediate snail host 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 27.13% in this study was found to be lower than the previous studies with the prevalence of 33.8% by Haile [25] and 34% by Hailu [12]

around Bahir Dar. However, this finding was higher than more recent reports 22.06% by Solomon [14]. 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 by tissue [8]. 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 for detecting schistosoma infection than coproscopical examination.

The prevalence of bovine Schistosomosis was found higher in local cattle (29.70 %) than that of cross cattle (17.10 %). Moreover, there was significant difference in prevalence ($p < 0.05$) between the two breeds. This finding is not in line with other reports in which the prevalence of bovine Schistosomosis is higher in cross cattle than local cattle [12, 14]. The reason for this difference in prevalence between breeds may be due to the cross breeds are mostly 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 is 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 [26].

The prevalence of Schistosomosis in this study which was higher in age group of cattle between 2 to 5 years than that of below 2 years and greater than 5 years of age. However, there was no any significant difference in prevalence among the three age groups. This finding is not in line with other reports of Hailu [12], Yalelet [13] and Solomon [14] around Bahir Dar. The lower prevalence (17.60%) in age group I cattle may be due to the fact that most calves are kept indoors hence have low chance of exposure to cercariae.

The prevalence of Schistosomosis in this study has no significant difference between the two sexes in line with the previous study by Solomon [14] conducted in Bahir Dar. The reason for the absence of significant difference indicates that the two sexes are equally exposed to the disease because they graze at the same time in the same place if and only if the two sexes are adults and local ones. In addition to this young and cross breed cattle are kept indoors that decrease the chance of parasitic infections.

In the postmortem examination of slaughtered animals to determine the adult Schistosome worms, portal veins were examined and incised 30% ($n = 30$) were found to be positive but only 12% ($n = 12$) of the 100 cattle were positive in coproscopical examination. The possible 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 [18].

CONCLUSION

This finding strongly suggests that bovine Schistosomosis is one of the endemic disease 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 throughout the world. The prevalence of the disease in local breeds was high as compared to the low number of cross breed animals taken as a sample versus the positive cross breeds as compared to the high number sampled local breeds versus the positive locals because their management system. Not only was the prevalence but also there is statistical difference between local and cross breeds, that indicates there is a strong management system takes place on cross breed cattle. 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.

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