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Prevalence of Bovine Shistosomiasisin Fogera District, South Gondar Zone, Amhara National Regional State, Northwest Ethiopia

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Abstract: A cross-sectional study was conductedcommencing October 2010 to January 2011 in Fogera Woreda, South Gondar Zone of Amhararegion, Northwestern Ethiopiain order todetermine the prevalence of bovine schistosomiasis. Simple random sampling was used to select the study animals andcoprological examination using sedimentation technique was applied for the recovery of schistosoma eggs from freshly collected fecalsamples. Out of 167 fecal samples examined 17 (10.17%) were found positive for schistosomiasis. There was no statistically significant difference observed (χ^2=1.506, df=2, p>0.05) among the three peasant associations visited even thoughWagetera showed higher prevalence 8(14.5%) than the other two Peasant associations. Similarly, though 10(12.05%) male and 7(8.33%) female cattle were found positive, therewas statistically insignificant difference observed between the two sexes (χ^2=0.53, df=1, p>0.05). Nevertheless, there were statistically significant differences appreciatedamongthe three age categories (χ^2=2.31, df=2, p<0.05). Cattle having less than 2 years, 2-5years and greater than 5 years old had 8(14%), 6(10.9%) and 3(5.4%) prevalencerespectively. Therefore, this study indicated that bovine schistosomiasis is becoming one of the major cattle health problems in the Fogera Woreda. Accordingly, farmers should be advised and educated regarding the franchises of the diseases and its intermediate vectors and also strategic use of anti-helminthics should be practiced to reduce pasture contamination with the fluke eggs.

Key words: Bovine · Coprology · Fogera · Prevalence · Schistosomiasis · Sedimentation Test

INTRODUCTION

Livestock production constitutes one of the principal means of achieving improved living standards in many regions of the developing world. In sub-saharan Africa countries livestock plays a crucial role both for the national economy and the livelihood of rural communities. It provides draught power and raw material for industry [1]. Livestock in great horn of Africa is a vital resource in promoting development. They provide 20-30% of the gross domestic product (GDP) and at the farmer level as much as 70% of cash income is generated from livestock [2]. In Ethiopia, livestock contribute about 30-35 % of agricultural gross domestic product (GDP) and 12-16 % of total GDP [3]. Domestic animals in various tropical areas may be infected with *Schistosomabovis* (cattle and sheep), *Schistosoma indium* (horses, cattle, goats and Indian bufflo), *Schistosomamatheei* (sheep, South Africa), *Schistosomasuis* (Swine and goats in India), *Schistosomajaponicum* (humans, cat and mammals in Asia) and *Schistosoma margrebowei* (horses, ruminants and elephants in Africa). All these species of schistosoma are found in mesenteric veins of the host and causes the disease hepatic fibrosis [4]. The disease affects sheep, goat and mostly cattle [5].

In Ethiopia, epidemiological studies conducted on *Bovine schistosomiasis* are suggestive of the endemicity of the disease particularly in the area with large permanent

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water bodies and marsh pasture area. The prevalence of *Schistosomabovis* has reported in different parts of Ethiopia from fecal sample examination study conducted in Gewane,1.5% and in Awassa, 5.5% [6], in Bahir Dar, 33.8% 12.3% [7], 17.4% [8], 29.0% [9], 10.93% [10] and 24.3% [11] and 28% in Kemissei [12].

Bovine schistsomiasis is one of the major constraints for livestock production in the woreda. However, data on the distribution of the disease in the area are lacking. On the other hand, current agro-ecological changes in the study area decreased the volume of water bodies and caused the known swampy area to be dried. This unfavorable condition for multiplication and development of snail intermediate host may influence the occurrence of Schistosomiasis in the study area. Therefore, the objective of this study was to estimate the prevalence of bovine schistosomiasis in Fogera District.

MATERIALS AND METHODS

Study Area: The study was carried out in Fogera District, South Gonder Zone and Amhara Regional Statecommencing October to December, 2010. The District covers 1l7, 405 Hectar. It accounts 54% hilly 11% Swampy 2%, Forest, 8% others like Water and Valley accounts 25%. The District is divided in to 27 Peasant associates (PA'S) and among these, eight PAs bordering Lake Tana with estimated water bodies of 23,354 Hectar. The District is also classified as one of the surplus productive District in the region [13]. Woreta is the capital city of FogeraDistrict and is located at 625 Km North West of Addis Ababa at altitude of 11° 58' N and longitude of 37°41'E. The altitude ranges from 1,774 to 2,410 meters above sea level. The area receives mean annual rain fall of 1,216mm and it can range from 1103-1336mm. The average minimum and maximum temperature of the District vary between 10.3°C to 27.2°C. The human population of the District is estimated about 197,000; 102,000 male and 95,000 female [14].

The population of cattle in Amhara region and South Gonder Zone is estimated to be about 10,513,000 and 1,183,000 respectively. The numbers of cattle in Fogera District is estimated about 201,000. Livestock is reared in the area with mixed farming and extensive grazing system. Farm animals are the major source of agricultural income for the livestock owners [14].

Study Population: The study population was cattle randomly selected from three Peasant Associations namely: Wagetera, Kidist Hana and Shina. The study animals were indigenous breed (*Bos indicus*) of both sexes and three age categories. All these animals were privately owned by small holder farmers and were managed under traditional extensive system.

Study Design: A cross-sectional study was used to determine the prevalence of bovine schistosomiasis. Simple random sampling methods were used to select the study animal in the area. A total of 167 cattle were randomly selected from all the three PAs andcoprological examination was conducted following appropriate sedimentation technique.

Sampling Method and Sample Size Determination: Simple random sampling method was applied to select study animals. During sampling age, sex and PAs were recorded. The age was categorized in to three categories. The desired sample size was calculated according to the formula given by Thrusfield [15]. To determine the sample size, the expected prevalence of 12.4%, reported by Amero [7] was considered by 95% confidence interval at an absolute precision of 5%. Therefore, 167 heads of cattle were required for this study.

Study Procedure: Fresh fecal sample were collected directly from the rectum of each study animals during the study period. Specimens were transported to Woreta Veterinary Clinic Laboratory in screw cap bottle that is preserved in 10% formaline. Faecal samples were prepared and examined using sedimentation techniques. During every sampling of the study animals; information on breed, sex, approximate age of individual animals and kebeles (peasant association) were recorded in prepared data recording sheet. The animals were classified in to three age categories:less than and equal to 2 years, above two and below 5 years and above 5 old.

Data Analysis: The data were first entered in to Microsoft Excel work sheet and analyzed using Statistical Package for Social Sciences (SPSS) software version 17. The prevalence of shistosomiasis was expressed as percentage with 95% confidence interval (CI) by dividing the total number of animals positives to the total number of animasexamined. Descriptive statistics was utilized to summarize the data. Chi-square calculation was conducted. Therefore; the significant differences between the prevalence of shistosomiasis were determined using Chi-Square test (χ^2).

RESULT

Of the total 167 fecal samples examined, 17(10.17%) were found positive for bovineschistosomiasis. There was no statistically significant difference observed among the three kebeles ($p>0.05$) even though Wagetera 8(14.03%) revealed the highest prevalencewhile the lowest in Shina 4(7.27%) (Table 1).

There was statistically insignificant difference observed in both sexes ($p>0.05$). The prevalence of bovine schistosomiasis in male and female were 10(12.05%) and 7(8.33%) respectively. Nevertheless, this shows that the prevalence of bovine shistosomiasis in male was slightlygreater than female (Table 2).

There was statistically significant difference observed ($p <0.05$) among the three age categories of cattle; likewise, the prevalence was relatively highest in cattle that are less than 2 years old 8(14.0%) and lowest in cattle greater than 5 years old 3(5.4%) (Table 3).

DISCUSSION

The present study revealed an overall prevalence of 10.17% in the study peasant associations and agro-ecological zone of Fogeraworeda; higher prevalence of bovine schistosomiasis was obtained when it is compared with prevalence of the disease reported by Lo and Lemma [6] whoreported 1.5% and 5.5% prevalence in Gewanie and Awassarespectively. This is probably due to the ecological, management and climatic difference between the two localities. Moreover, the management system in practice could also be the probable reason for the variation of the prevalence study in Fogera, 12.4% by Amero [7] and 10.93% by Almaz [10].

The result of this study unlike the result of similar earlier studies conducted in Bahir Dar, 33.8% [11], 17.4 % [8], 29.0% [9] and 24.73% [11] has lower prevalence based on fecal examination. The variation in the prevalence of schistosomiasis may be due to the lower humidity and less swampy nature of the study area, which is not suitable for the development and multiplication of the intermediate host; snail. Furthermore, expansionof rice production and development of mechanized irrigation system in the study area of the woredawhich is drained its swampy nature of the land and the ideal moisture condition making unfavorable for snail breeding and development of larval stages within the snail, an intermediate host. During the study period, one of the most important factors that influence the occurrence of schistosomiasis in the area was unavailability of a suitable snail host [16].

The result of the study showed that a relatively high prevalence of bovine schistosomiasis in Wagetera than the other two peasant associations. This difference was

Table 1: The prevalence of Schistosomiasis in the three Peasant Associations (PAs)

PAs	No of cattle examined	No of cattle found positive	Percent of cattle affected (%)
Wagetera	57	8	14.03
Kidist Hana	55	5	9.09
Shina	55	4	7.27
Total	167	17	10.17

$\chi^2 = 1.506$, $p=0.471$

Table 2: The prevalence of schistosomiasis based on sex.

Sex	Noof cattle examined	No of cattle found positive	Percent of cattle affected (%)
Male	83	10	12.05
Female	84	7	8.33
Total	167	17	10.17

$\chi^2=0.63$, $p=0.458$

Table 3: The prevalence of Schistosomiasisbased on age.

Age	No of cattle examined	No of cattle found positive	Percent of cattle affected (%)
<2 years	57	8	14.00
2 -5 years	55	6	10.90
>5 years	55	3	5.40
Total	167	17	11.17

$\chi^2=2.306$, $p=0.04$

due to swampiest and moisture nature of Wagetera than the other two. This can indicate thatas the site is nearer to Lake Tana like Wagetera which is more prevalent. Similarly, Urquhart *et al*. [16] has reported that water lodged and poorly drained areas with acidic soils are often endemic for schistosmiasis.

In this study, the prevalence of the disease is dependent on age and it is for the reason that cattle less than 2 years old has highest prevalence since no immunity to resist the new-infection than others that can graze at marshy area throughout the day [17].

The statistical analysis of this study showed that age had significant influence on the prevalence of bovine schistosomiasis in the area, but sex had no influence on the prevalence of the disease.

There was no statistically significant difference observed between the rates of infection in relation to both sexes. Theresults indicated that both sexes were at about the same risk to acquire the infection. This is because of equal exposure to the risk factors as there were no restriction on movement for grazing and contact with the parasite in terms of sex and age. The cattle were seen grazing in the area that necessitates more contact times with the larval stage of the parasite and the snail intermediate vector. This creates ideal condition for the multiplication of schistosoma and increases the epidemiology of the disease. Kassaw [5] and Nagi *et al*. [18] also reported that the increased contact time with schistosoma infested habitat increases the rate and endemicity of schistosomiasis.

CONCLUSION

The prevalence of bovine schistosomiasis recorded in this study based on coprologicalexamination revealed the presence of schistosomiasis in the cattle population of the District. Thedisease was detected in both sexes and age groups of the study animals. In addition, the occurrence of the diseases is closely linked to the presence of bio-types suitable for the development and multiplication of intermediate hosts. Therefore, this study revealed that bovine schistosomiasiswas one of the major parasitic diseases contributing to loss in productivity and production of cattle in the study area.

Recommendations: Schistosomiasis should be considered as one of the major limiting factor to livestock productivity in Fogeradistrict and its surrounding. Researches should be encouraged towards the development of vaccines for the control of bovine schistosomiasis. Implementation of appropriate control measures for the intermediate host should be encouraged. Farmers should be advised and educated about the franchisesof the diseases and its intermediate vector. Strategic use of anti-helminthicsshould be practiced to reduce pasture contamination with fluke eggs. Detailed studies involving additional risk factors should be conducted on this similar study.

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