

Full Length Research Paper

Prevalence of bovine of schistosomosis in and around Nekemte, East Wollega zone, Western Ethiopia

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A cross-sectional study was conducted from March 2016 to May 2016 at Guto Gida District, Nekemte, Ethiopia to determine the prevalence of bovine schistosomosis. Simple random sampling method was used to select the study animals and sedimentation technique was applied for finding *Schistosoma* eggs from fresh fecal samples. Out of 384 fecal samples examined, 22 were found positive indicating an overall prevalence of 5.7% schistosomosis in the study area. The prevalence of bovine schistosomosis was higher in Jirenga kebele (9.1%) than Gaarii kebele (4.6%) and Dalo kebele (3.7%). However, no statistically significant difference in the prevalence of bovine schistosomiasis in relation to origin was found. Similarly, there was no statistically significant difference observed between both sexes ($P>0.05$). The prevalence in body condition category was reported relatively higher in poor body condition (8.4%) and lower in good body condition (3.8%). However, no statistically significant differences appreciated among the three body condition categories ($P>0.05$). The finding indicated that, schistosomosis should be taken into consideration as one of the major limiting factor to livestock productivity at Guto Gida District. The control measures against schistosomosis must be designed to target either the parasite or the snail intermediate host.

Key words: Bovine, *Guto Gida*, prevalence, schistosomiasis

INTRODUCTION

Schistosomosis is an infection which occurs due to trematodes of genus *schistosoma*. The disease, characterized by its chronic nature, affects the productivity and production performances and predisposes animals to other diseases in the World (McCauley et al., 2000), and it is endemic in the tropical and subtropical countries of Africa, Asia and Southern Europe (Lawrence, 2001).

Epidemiological studies on bovine schistosomosis are suggestive of the endemicity of the infection particularly in areas with large permanent water bodies and marshy pasture areas. In Ethiopia, the optimum range for distribution of *S. mansoni* has been reported as 1500 to 2000 m above sea level (masl) (Gashaw, 2010). *Schistosoma bovis* has a localized distribution found commonly in Northern, Eastern, South Western and

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central parts of Ethiopia (Fekade et al., 2002); It is affecting all ages of animals and mainly prevalent in cattle kept around lakes and rivers (Dwight et al., 2003; Pitchford, 2006).

Schistosomiasis is transmitted by using snails as an intermediate host; the immature infective form penetrates the skin of the host and may also infect cattle by ingestion through drinking water (Allen et al., 2002; Lindbergh et al., 2006). Animals affected by the disease show different clinical signs such as diarrhea, sometimes blood stained and containing mucus, and also anorexia, thirst and emaciation is the sign shown by animals with disease (Gutierrez, 2004).

Diagnosis of the disease is primarily based on the history of schistosomiasis in the area and the identification of snail habitats with history of access to natural water bodies (Bedarkar et al., 2000; Pawar et al., 2016). Postmortem examination, hematological tests and examination of feces for *schistosoma* eggs are also useful. The clinical signs alone will not be sufficient to arrive at definitive diagnosis but, it should be used to indicate the necessity of feces examination, which reveals the eggs of parasites mixed with blood and mucous (Thrusfield, 2005).

For treating the disease, older drugs include antimonial preparation, tartar emetic, antimosan and stibophen, and niridirozole and trichlorphon. The praziquantel, which is a drug of choice for treatment of human schistosomiasis is also effective in ruminant at 15-29 mg/kg, peros (Gracia and Bruckner, 2007).

The effective control of the disease is to prevent contact between the animals and the parasite by fencing of infected waters and supplying clean water and also by the destruction of intermediate host or snails (Hansen and Perry, 2004). Even though, schistosomiasis is an economically important disease of livestock leading to huge economical losses, due to morbidity and mortality and thereby contributing to productivity loss, there is no considerable work done on the prevalence of the disease in and around Nekemte.

Therefore, the objective of this study was to determine the prevalence of Schistosomiasis in cattle in Nekemte area.

MATERIALS AND METHODS

Study area

The study was conducted from March to May, 2016 in Guto Gida district, Nekemte town, East Wollega Zone of Oromia Regional State, Ethiopia. The district is about 331 km from Addis Ababa to the West. The area has average temperature of 20°C and mean annual rainfall of 21500 mm. The altitude of the area ranges from 1300 – 3140 m a. s. l. According to the Nekemte District Agricultural Office, livestock population of cattle in head is 85,584, sheep 14,702, Goat 11,861, Equine 98,674, chicken 94,276 and mixed crop and livestock farming system is the mode of agriculture in the district in which cattle and sheep operate as major livestock, highly important for livelihood of the local population (NWAROD, 2016).

Study population

The study population was cattle with different age groups, body condition and sex. The age of animal was determined based on dentition (Pope, 2008) and the body condition of the animals was classified into three groups:- poor, medium and good based on visibility of skeleton by inspectional examination (Debont et al., 2005).

Study design

A cross sectional study was used to determine the prevalence of bovine schistosomiasis and its risk factors at Nekemte area from March to May, 2016.

Sampling and sample size determination

From area of Nekemte town the Kebeles (Jirenga, Gaari and Dalo) were selected by purposive sampling based on animal population of the Kebeles and consideration of the representativeness.

The desired sample size was determined by using the formula given by Thrusfield (2004); also, with 95% confidence level and 5% desired absolute precision, and since there was research conducted in this area, 50% expected prevalence was taken.

$$N = \frac{1.96 * P_{exp} (1 - Exp)}{d^2}$$

where

n = required sample size

p_{exp}= prevalence

d² = Desired absolute precision.

$$N = \frac{1.96 * 0.5(1 - 0.5)}{(0.05)}$$

=384

Accordingly, animals were selected randomly to estimate the prevalence of the infection in the study area.

Study method and sample collection

Coprosopic examination

The fresh fecal sample was collected directly from rectum of randomly selected animals and preserved in 10% formalin in universal bottle to prevent hatching of miracidia. Then eggs were examined by fecal sedimentation techniques and observed under microscope in the laboratory (Ash and Orihel, 2004).

Data management and analysis

The data was entered into MS excel Database, coded, thence analyzed using SPSS 20.0 version statistical software program. The prevalence was calculated by dividing number of positive animals by total number of animals tested. Pearson's chi square (x²) was used to evaluate the association between the prevalence the disease with related risk factors. P value < 0.05 was considered as significant in the analysis.

RESULTS

Overall prevalence

Among 384 cattle examined using coproscopical

Table 1. Prevalence of bovine schistosomosis based on PAs or kebeles.

PAs or Kebeles	No. examined	No. infected	Prevalence (%)	X ²	P value
Garii	129	6	4.6	0.928	0.055
Jirenga	120	11	9.1		
Dalo	135	5	3.1		
Total	384	22	5.7		

Table 2. Prevalence of bovine schistosomosis based on sex.

Sex	No. examined	No. infected	Prevalence (%)	X ²	P value
Male	187	13	6.9	1.009	0.382
Female	197	9	4.5		
Total	384	22	5.7		

Table 3. Prevalence of bovine schistosomosis based on body condition.

Body condition	No. examined	No. infected	Prevalence (%)	X ²	P value
Poor	119	10	8.4	0.503	0.073
Medium	135	7	5.1		
Good	130	5	3.8		
Total	384	22	5.7		

examination, 5.7% (22/384) were found to be positive for bovine schistosomosis or infected.

Prevalence based on origin

According to the present study, the prevalence of bovine schistosomosis was higher in Jirenga kebele (9.1%) than Gaarii kebele (4.6%) and Dalo kebele (3.7%). However, there was no statistically significant difference on the prevalence of bovine schistosomosis based on three PAs ($p > 0.05$) as indicated in Table 1.

Prevalence based on sex

The study indicated that, the prevalence of bovine schistosomosis in male and female was 6.9% and 4.5%, respectively. Although the prevalence was relatively higher in female as indicated in Table 2 the difference was not statistically significant ($P > 0.05$).

Prevalence based on body condition

Prevalence of bovine schistosomosis on poor body condition animals was 8.4% and medium body condition (5.1%). However, animals with good body condition

showed prevalence of 3.8%. As described in Table 3, significant difference ($P > 0.05$) was not observed among body condition of the study animals for the occurrence of schistosomosis.

Prevalence based on age

According to the age of animal, the prevalence of schistosomosis varied. Low prevalence was observed in young (4.9%), and highest prevalence was observed in adult (6.2%). However, there was no significant difference ($P > 0.05$) among age groups (Table 4).

DISCUSSION

The overall prevalence of bovine schistosomosis infection of the study area was found to be 5.7%. When this result is compared with the prevalence of other authors in the country it is much lower than the finding of Mersha et al. (2012) which was 13.7% in Fogera. Similarly, 22.06% was reported in and around Bahir Dar (Solomon, 2008) and 27.13% in Dembia (Alemseged, 2010). The difference in prevalence may be due to the variation in the study seasons, sample size, humidity, management and climate change between various agro ecologies. The present study is nearly similar with that of Mihret and

Table 4. Prevalence of bovine schistosomosis based on of animal age.

Age	No. examined	No. infected	Prevalence (%)	X ²	P value
Young	161	8	4.9	0.297	0.661
Adult	223	14	6.2		
Total	384	22	5.7%		

Samuel (2015) (7.6%) in and around Debre Tabor town, South Gondar Zone of Amhara region, Northwestern Ethiopia, which can be due to similar management in the areas.

The relatively greater prevalence of the disease was in Jiregna and Gaarii PAs maybe due to swampiest and moisture nature of most of the grazing areas in these PAs. Similarly, many authors also reported that water lodged and poorly drained areas with acidic soils are often endemic for schistosomosis (Almaz, 2007). Mihret and Samuel (2015) also reported that there was difference of bovine schistosomosis prevalence based on origin but there was no significant difference between origin and the infection.

The higher prevalence of bovine schistosomosis was in adult animals in this study and agrees with the work of (Alemseged, 2010) who reported a prevalence of 17.6% in young animals and 30.10% in adults in Dembia district, disagreeing with the work of Taylor et al. (2007) who reported highest prevalence in young animals.

The variation in the prevalence was found in male (6.9%) and in female (4.5%) revealing no statistically significant ($P > 0.05$) difference. This variation is similar with previous study which was 29.61% in male and 19.54% in female (Solomon, 2008), in and around Bahir Dar and 30.70% in male and 23.30% in female (Alemseged, 2010) in Dembia district. The study disagrees with the study conducted by Mihret and Samuel (2015) and found higher prevalence in female (33.1%), and lowers in male (27.1). The results indicated that both sexes have the same risk to acquire disease. This is because of equal exposure to the risk factors since there were no restrictions on movement for grazing and contact with the parasite and animals in terms of sex.

This exacerbates the multiplication of *Schistosoma* and increases the epidemiology of the disease. It was also reported that the increased contact time with *Schistosoma* infested habitat increases the rate and endemicity of schistosomosis.

Schistosoma infection rate in relation with body condition score in the present study varied in cattle. Animals with poor body condition score were more affected than other groups of animals. Similarly, Merawe et al. (2014) affirmed that the infection rate increase with animals which have poor body condition score. This could be due to the acquired immunity status of poor body condition and weak animals becoming more suppressed and susceptible possibly due to malnutrition

and other parasite infection. Thus, infected animals may require long period of time to respond against *Schistosoma* infection. This gives suitable time for establishment and fecundity of the parasite in animals. This finding also coincides with the work of Belayneh and Tadesse (2014) that accounted the prevalence of *Schistosoma* as more common in animals with poor body score animals than medium and good body condition.

CONCLUSION AND RECOMMENDATION

According to the present study, the overall prevalence of bovine Schistosomosis was found to be 5.7% in and around Nekemte. The study also revealed that the prevalence of schistosomosis is high in Jirenga and followed by Gari peasant associations. The prevalence of the disease is also closely linked with environmental factors that are suitable for the development and multiplication of snail which is intermediate hosts and the parasite. Therefore, depending on the result of the study, the following recommendations are forwarded:

- (i) There should be initiation and awareness creation on the prevention and control of snails.
- (ii) Further epidemiological investigations should be conducted to assess the *Schistoma* infection and its associated risk factors.
- (iii) There should be regular deworming and veterinary service in the study area.
- (iv) Grazing management should be involved to avoid grazing around marshy area in which snail population is high.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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REFERENCES

- Alemseged G (2010). Prevalence of bovine schistosomosis in Dembia District North west Ethiopia. Dvm thesis, Faculty of Veterinary Medicine. Gondar, Ethiopia.
- Allen GP, Adrian GS, Richard OG, Gail MW, Donald PM (2002). Schistosomiasis. *New Engl. J. Med.* 346:1212-1220.
- Almaz H (2007). Pathology of naturally occurring *Schistosoma* infection in cattle slaughtered at Bahir Dar municipal abattoir North West Ethiopia. MSc thesis, Faculty of Veterinary medicine, Addis Ababa University, Debere Zeit, Ethiopia.
- Ash LA, Orihel TC (2004). *Parasites: A guide to Laboratory Procedures and Identification.* ASCP Press, American Society of Clinical Pathologists, USA.
- Bedarkar SN, Narladkar BW, Despande PD (2000). Seasonal prevalence of snail borne fluke infections in ruminants of Maratwada region. *J. Vet. Parasitol.* 14:51-54.
- Belayneh L, Tadesse G (2014). Bovine schistosomiasis: A Threat in Public Health perspective in Bahir Dar Town, Northwest Ethiopia. *Acta. Parasitol. Glob.* 5:1-6.
- Debont J, Verduyck J, Sabbe F, Southgate VR, Rollinson D (2005). *Schistosoma bovis* infection in cattle: changes associated with season and age. *Vet. Parasitol.* 57:299-307.
- Dwight D, Bowman k, George A (2003). *Parasitology for Veterinarians,* 1st ed. USA: Elsevier, pp. 129-133.
- Fekade D, Woldemichael TA, Tadele S (2002). Pathogenesis and pathology of schistosomiasis, 5th edition. Addis Ababa University printing press, Addis Ababa. P 34
- Gracia LS, Bruckner DA (2007). *Diagnostic Medical Parasitology.* Elsevier Science Publishing Co. Inc., New York, USA.
- Gashaw A (2010). Epidemiology of intestinal schistosoma in Hayk town, North East Ethiopia. Addis Ababa.
- Gutierrez Y (2004). *Diagnostic Pathology of Parasitic infections with clinical correlation.*
- Hansen J, Perry B (2004). The epidemiology, Diagnosis and control of Helminthes parasite of ruminants. *A hand book of Animal Production parasite. Immunology* 26:167-175.
- Lawrence JA (2001). Bovineschistosomiasis in Southern Africa. *Helminthologic abstracts.* pp: 261-270.
- Lindbergh R, Johansen M, Nitsson C, Nansen P (2006). An immunohistological study of phenotypic characteristics of cells of the inflammatory response in the intestine of *Schistosoma bovis*-infected goats. *Parasitology* 118(1):91-99.
- Mc-Cauley EH, Majid AA, Tayed A (2000). Economic evaluation of the production impact of bovine Schistosomiasis. pp: 735-754.
- Merawe M, Amsslu K, Hagos Y, Afera B (2014). Intestinal schistosomosis of Bovine and Ovine in Fogera district, South Gondar Zone, Amhara National Regional State, Ethiopia. *Acta Parasitol. Glob.* 5:87-90.
- Mersha C, Belay D, Tewodros F (2012). Prevalence of Cattle schistosomosis and Associated Risk Factors in Fogera Cattle, South Gondar Zone and Amhara National Regional State, Ethiopia. *J. Adv. Vet. Res.* pp: 53-56.
- Mihret T, Samuel D (2015). Prevalence of Bovine Schistosomosis and its Associated Risk Factor in and Around Debre Tabor Town, North West of Ethiopia. *Eur. J. Biol. Sci.* 7(3):108-113.
- NWAROD (Nekemte woreda Agricultural and Rural Development office), (2016). Annual progress report.
- Pawar PD, Singla LD, Kaur P, Bal MS (2016). Caprine Schistosomosis: Prevalence and associated host factors in Barnala District of Punjab State. *Proceedings of 15th Convocation of National Academy of Veterinary Sciences India and National Symposium on "Sustainable Livestock Development for Food and Nutritional Security: Way Forward"* (22-23 October 2016) P. 16.
- Pitchford RJ (2006). A check list of definitive host exhibiting evidence of the genus *Schistosoma* Weinland-1858 acquired naturally in Africa and Middle East. *J. Helminthol.* 51:229-252.
- Pope GM (2008). Determining the age of cattle by their teeth. *Farmers' Bulletin* 1066 USA department of Agriculture. pp. 1-12.
- Solomon O (2008). Observations on the prevalence of *Schistosoma bovis* infection in Bahir Dar area. North central Ethiopia. DVM Thesis, Faculty of veterinary Medicine, Mekele University, Ethiopia.
- Taylor MA, Coop RL, Wall RL (2007). *Veterinary parasitology* 3rd edition, Blackwell publishing, Oxford. pp. 201-208.
- Thrusfield M (2004). *Veterinary epidemiology,* 2nd edition. UK, Black well sciences.
- Thrusfield M (2005). *Survey in veterinary epidemiology* 2 ed. Cambridge: Blackwell science. Ltd. pp. 182-189.