DOI: http://dx.doi.org/10.4314/star.v5i4.02
ISSN: 2226-7522 (Print) and 2305-3372 (Online)
Science, Technology and Arts Research Journal
Sci. Technol. Arts Res. J., Oct.-Dec. 2016, 5(4): 013-020
Journal Homepage: http://www.starjournal.org/

Original Research

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

Abraham Kebede[1*] Jiregna Dugassa[1] and Dereje Abera[1]
[1]School of Veterinary Medicine, College of Medical and Health Science, Wallaga University, P.O. Box, 395, Nekemte, Ethiopia

Abstract

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 of *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 (9.2%) 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.

Article Information

Article History:
Received : 10-10-2016
Revised :16-11-2016
Accepted :20-12-2016

Keywords:
Bovine,
Guto Gida,
Prevalence,
schistosomiasis

***Corresponding Author:**
Abraham Kebeder[1]
E-mail:
abrahamkebede2016@gmai com

INTRODUCTION

Schistosomosis is an infection which occurs due to trematodes of genus *schistosoma.* The disease, characterized by its chronic nature and affects the productivity and production performances and predisposes animals to other diseases in the World (Mc-Cauley *et al.*, 2000), and it is endemic in the tropical and subtropical countries of Africa, Asia and Southern Europe (Lawerence, 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 meter above sea level (masl) (Gashaw, 2010). *Schistosoma bovis* has a localized distribution which found commonly in

Northern, Eastern, South Western and 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).

Schistosomosis 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 (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 Allen *et al.*, 2002; Lindbergh *et al.,* 2006).

Diagnosis of the disease is primarily based on the history of schistosomosis in the area and the identification of snail habitats with history of access to natural water bodies (Bedarkar *et al.*, 2000). Postmortem examination, hematological tests and examination of feces for *schistosoma* eggs are also useful .The clinical signs alone will not sufficient to arrive 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 (Thrusfied, 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 schistosomosis, is also effective in ruminant at 15-29 mg/kg, peros (Gracia & 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 & Perry, 2004).

Though Ethiopia is recognized for its vast wealth Sample Size Determination, the desired sample size was of livestock, the economic benefit derived from the livestock center does not commensurate with the potential (FAO, 1993). Development of large animal is constrained among other important factors, by wide spectrum of the diseases like Schistosomosis. In our country, Schistosomosis appears to be spreading. The major transmitting sites are small streams all over the highlands of Ethiopia, lakes like Tana, Zeway as well as irrigation systems, such as sugar state Wonji do also play a similar role (Shibru *et al.,* 1989). Even though, schistosomiasis is an economically important disease of livestock leading huge economic 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 bovine 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 Wallaga Zone of Oromia Regional state, Ethiopia. The district is about 331 km from Addis Ababa to the West. The area has average temperature of 20^0C, mean annual rainfall 21500mm. The altitude of the area ranges from 1300 -3140m 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 as a major livestock, which are highly important for livelihood of the local 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).

A cross sectional study was used to determine the prevalence of bovine schistosomosis in and around Nekemte town area from March to May, 2016.

From area of Nekemte town the Kebeles (Jirenga kebele, Gaari kebele and Dalo kebele) 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 (Thrushfield, 2004), and with 95% confidence level 5% desired absolute precision and since there was research conducted in this area, 50% expected prevalence was taken.

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

Whereas:-

n=required sample size

pexp= prevalence

d2= Desired absolute precision.

$$N = \frac{1.96^2 * 0.5(1-0.5)}{(0.05)^2} = 384$$

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

Study method and Sample collection

Coproscopic 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 was examined by fecal sedimentation techniques and observed under microscope in the laboratory (Ash & 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(x^2) was used to evaluate the association between the prevalence the disease with a related risk factors. P value < 0.05 was considered as significant in the analysis.

RESULTS

Over all prevalence

Among 384 cattle examined using coproscopical examination **5.7**% (22/384) were found to be positive for bovine schistosomosis or infected.

Prevalence based on origin

According to 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

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		
Jirenga	120	11	9.2	3.928	0.055
Dalo	135	5	3.7		
Overall	384	22	5.7		

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).

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**		

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.

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		
Medium	135	7	5.1	2.503	0.073
Good	130	5	3.8		
Total	**384**	**22**	**5.7**		

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: Prevalence of bovine schistosomosis based on of animal age**.**

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

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 with such as 13.7 % in Fogera (Mersha *et al.,* 2012), 22.06% in and around Bahir Dar by (Solomon, 2008) and 27.13% in Dembia by (Alemseged, 2010). This much difference may be due to the variation in the study seasons, sample size, humidity, management and climate change between various agro ecologies. The present study mostly similar with the work of Mihret and Samuel (2015) that was (7.6%) in and Around Debre Tabor Town, North West of Ethiopia; this can be due to similar management in the areas.

The relatively greater prevalence of the disease was in Jiregna and Gaarii PAs. May be 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 agrees with the work of (Alemseged, 2010), who reported a prevalence of 17.6% in Young animals and 30.10% adults in Dembia district and disagrees with the work of (Taylor *et al.,* 2007) who reported highest prevalence in young animals.

The variation in the prevalence was found (6.9%) in male and (4.5%) in female revealed 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 was disagrees with the study conducted by Mihret and Samuel (2015) and found higher prevalence in female (33.1%) and lower 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; 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 was 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 that acquired immunity status of poor body condition and weak animals become more suppressed and susceptible which might be due to malnutrition and other parasite infection. So, 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* more common in animals with poor body score animals than medium and good body condition.

CONCLUSIONS AND RECOMMENDATIONS

According to the present study the overall prevalence of bovine Schistosomosis was found to be 5.7% in and around Nekemte. According to that study the prevalence of bovine schistosomosis is high in Jirenga and followed by Gari peasant associations. The prevalence of the disease is also closely linked with environmental factors those 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:

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

Authors' Contributions

Abriham kebede and Jiregna Dugassa designed the methodology and created the survey instrument, drafting and writing of the manuscript and analyzed the data. Abriham kebede and Dereje Abera contributed to reviewing the manuscript to be ready for publication. All authors read and approved the final manuscript.

Conflict of interest

The authors declare that they have no conflict of interest

Acknowledgements

The authors are extending their grateful acknowledgements to Wollega University, school of Veterinary medicine, for their inspiration to complete this work. Also we would like thanks the people (farmers and animal health workers) of in and around Nekemte for their collaboration in allowing their animals for collection of fecal sample.

REFERENCES

Alemseged, G. (2010). *Prevalence of bovine schistosomosis in Dembia District North west Ethiopia. Dvm thesis, faculty of veterinary medicine*. Gondar, Ethiopia.

Allen, G.P., Adrian, G.S., Richard, O.G., Gail M.W., & Donald, P.M. (2002). Schistosomiasis .*The New England 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, Bushoftu, Ethiopia.

Ash, L.A., Y & Orihel, T.C. (2004). *Parasites: A guide to Laboratory Procedures and Identification.* ASCP Press, American Society of Clinical Pathologists: USA.

Bedarkar, S.N., Narladkar, B.W., & Despande, P.D. (2000). Seasonal prevalence of snail borne fluke infections in ruminants of Maratwada region. *Journal Veterinary Parasitol*, *14*, 51-54.

Belayneh, L., & Tadesse, G. (2014). Bovine schistosomiasis: A Threat in Public

Health perspective in Bahir Dar Town, Northwest Ethiopia. *Acta Parasitolog Globalis, 5,* 1-6.

Debont, J., Vercruysse, J., Sabbe, F., Southgate, V.R., & 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,* USA*:* Elsevier.

Fekade, D., Woldemichael, T.A., & Tadele, S. (2002). *Pathogenesis and pathology of shistosomiasis (*5th edition). Addis Ababa: Addis Ababa University printing press.

FAO, (1993). *Agricultural statistical data. Statistics division*. Italy: Rome.

Garcia, L.S., & Bruckner, D.A. (2007*). Diagnostic Medical Parasitology*. USA: Elsevier.

Gashaw, A. (2010). Epidemiology of intestinal schistosoma in Hayk town, North East Ethiopia: Addis Ababa.

Hansen, J., & Perry, B. (2004). The epidemiology, Diagnosis and control of Helminthes parasite of ruminants. *A hand book of animal prod and parasite and Immunology, 26*, 167-175.

Lawerence, J.A. (2001). Bovine schistosomiasisin Southern Africa*. Helminthologic abstracts*, 261-270.

Lindbergh, R., Johansen, M., Nitsson, C., & Nansen, P. (2006). An immuno-histological study of phenotypic characteristics of cell of the inflammatory response in the intestine of Schistosoma bovis infectection. *Parasitology, 118*, 91-99.

Mc-Cauley, E.H., Majid, A.A., & Tayed, A. (2000). *Economic evaluation of the production impact of bovine Schistosomiasis,* 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 Parasitolgical Globalis, 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. *Journal of Advanced Veterinary Research***,** 53-56.

Mihret Tsega & Samuel Derso (2015). Prevalence of Bovine Schistosomosis and its Associated Risk Factor in and Around Debre Tabor Town, North West of Ethiopia European. *Journal of Biological Sciences, 7(*3), 108-113.

Pawar, P.D., Singla, L.D., Kaur, P., & Bal, M.S. (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),

Pitchford, R.J. (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*, 29-52.

Pope, G.M. (2008). Determining the age of cattle by their teeth. *Farmers' Bulleitin1066 USA departement of Agriculture*, 1-12.

Shibru, T. Getachew, T., & Kloos, H. (1989). *Schistosomosis in Ethiopia*. Addis Ababa: Addis Ababa printing press.

Solomon, O. (2008). Observation on the prevalence of Schistosoma Bovis infection in Bahir Dar area, North Central Ethiopia. *Global Veterinaria*, *3,* 13-16.

Taylor, M.A., Coop, R.L., & Wall, R.L. (2007). *Veterinary parasitology* (3rd edition). Oxford: Blackwell publishing.

Thrushfield, M. (2004). *Veterinary epidemiology* (2nd edition). UK, Black well sciences.

Thrusfied, M. (2005). *Survey in veterinary epidemiology* (2nd edition). Cambridge: Blackwell.