

Full Length Research Paper

Study on ovine fasciolosis: Prevalence and associated risk factors in North Gondar Zone, Ethiopia

Mastewal Birhan Atanaw^{1*} and Malede Birhan Atanaw²

¹School of Veterinary Medicine, Hawassa University, Hawassa, Ethiopia.

²Department of Animal Production and Extension, Faculty of Veterinary Medicine, University of Gondar, Ethiopia.

Accepted 16 November, 2017

A cross sectional study was conducted from November to April, 2011 in three districts (Gondar town, Gondar Zuria, and Dembia) of North Gondar Administrative Zone (NGAZ). The objectives of the study, were to determine the prevalence ovine fasciolosis and to asses risk factors associated with fasciolosis in sheep. Coprological examinations, was used to collect fresh fecal samples directly from live sheep during the study period. Out of the total 400 fecal samples examined, 173 (43.3%) were positive for *Fasciola* eggs. There was no statistically significant difference ($P > 0.05$) among age groups (young (45.8%), adult (39.7%), and old (42.4%)) and between sexes (male (42.74%) and female (43.35%)), respectively. However, there was statistically significant variation ($P < 0.05$) between different body conditions of the animal (good body condition (28.5%), medium (41.7%), and poor body condition (97.8%)). The prevalence of fasciolosis was higher in animals with poor body condition. Also, there was statistically significant difference among the three districts ($P < 0.05$). The highest prevalence rate was detected in Gondar Zuria districts (34.6%), Dembia (43.7%), and Gondar town (51.9%), correspondingly. This study indicated that, fasciolosis is the major obstacles of sheep production in the study area by inflicting remarkable direct and indirect losses to the animal. Therefore, strategic deworming of sheep with anthelmintics can reduce the prevalence rate of the parasites.

Key words: Ethiopia, North Gondar, ovine, coprological, fasciolosis.

INTRODUCTION

Ethiopia has an enormous livestock resource with a total contribution of 15% gross domestic product and 33% agricultural output (Drug Administration and Control Authority (DACCA), 2006). Current estimates show that there are 41.5 million heads of cattle, 41 million sheep and goats, 1.1 million heads of dromedary camel, 5 to 8 million equines, and 52 million chickens (Central Statistical Agency (CSA), 2003). From various constraints, livestock diseases are the most important factor that has a consequence on morbidity and mortality of animals in the country. Loss due to parasitic diseases is of great interest to many tropical countries (Yosef, 1993).

Fasciolosis or liver fluke is an important parasitic disease of domestic ruminant animals caused by two liver fluke species, which are: *Fasciola hepatica* and *Fasciola gigantica* (Trematoda). *F. hepatica* has cosmopolitan distribution, mainly in temperate zones, while *F. gigantica* is found in tropical regions of Africa and Asia. Thus, the two Fasciolid species overlap in many Africa and Asian countries. Although, in such cases, the ecological requirements of the flukes and their snail intermediate host are distinct (Abebe et al., 2010). The disease is also found in older animal health, growth rate, and development. Apart from its great veterinary important throughout the world, *F. hepatica* has recently been shown to be a re-emerging and wide spread zoonosis affecting numerous human population in the world (Phiri et al., 2005).

Fragmented reports suggest that fasciolosis is a highly

*Corresponding author. E-mail: mastewalba@yahoo.com. Tel: +251-0918255996.

prevalent disease in North Gondar area where livestock represent the pillar of the local economy and plays a vital role in the livelihood of the farming community. It appeared that the loss from fasciolosis is aggravated during the long-dry season mostly (November through April) when the nutritional conditions of the animal in the traditional farming system are generally poor (crop residue). On the other hand, flukicidal treatment is often administered during the rainy season when transmission is anticipated. Although, epidemiological study and assessment of the magnitude of the problem, when the grazing situation becomes sub-optimal is beneficial, the clue to envisaging a rational disease controls strategy in this environment (Yilma and Malon, 1998).

The fluke lifecycle requires intermediate host (snail) to complete transmission to a new ruminant host. The liver is damaged and condemned and the subclinical and chronic disease usually results in decrease production of meat, milk and wool, second's bacterial infection, fertility problems, and great expenses with antihelminthics (Daryani et al., 2005).

Various reports indicated that fasciolosis is a serious problem for livestock production in Ethiopia causing considerable economic losses. A rough estimate of the economic losses due to decreased productivity caused by ovine fasciolosis is about 350 million Birr per year (Yosef, 1993). Therefore, the study was focused on the following specific objectives:

- (1) To determine the prevalence of ovine fasciolosis in the study area;
- (2) To assess the various risk factors associated with fasciolosis;
- (3) To recommend the relevant control and preventive strategies pertinent to the prevailing local situations in the study community.

MATERIALS AND METHODS

Study area

This study was conducted in North Gondar Administrative Zone of Amhara Regional State. Gondar is located at the North West part of Ethiopia at distance of 748 km from Addis Ababa. The total human population of Gondar town is estimated to be about 276187 by North Gondar Zone Agricultural and Rural Development Office (NGZARDO, 2009).

Study animals and design

According to Mbaya et al. (2009), different age groups (young < 1 year, adult 1 to 2 years, and old > 2 years of sheep) were used in the study. Sheep reared in three selected districts of North Gondar Zone were randomly sampled to examine prevalence of ovine fasciolosis in the study. Both male and female, of different age groups of sheep were included in the study area. A cross-sectional study was employed to know the current status of ovine fasciolosis in North Gondar Zone.

Sample size determination

Simple random sampling technique was used to select the study animals in the study area. The sample size was determined according to Thrusfield (2005) with 95% confidence interval and 5% absolute precision, since there was no previous research work done in the study area, the expected prevalence rate was taken as 50%. Therefore, 384 sheep were obtained for the study using formula. But to increase precision and to get more accurate, the sample size was taken as 400.

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

where n = sample size, P_{exp} = expected prevalence, and D = desired absolute precision.

A total of 400 sheep were selected from the target population, and were sampled (50% prevalence and $d = 0.05\%$ was considered).

Coprological examination

Fecal samples were collected directly from the rectum and put in airtight sample bottle, and were immediately taken to Gondar University Parasitology Laboratory for examination. In the laboratory, the fecal samples were screened for the presence of *Fasciola* egg by using sedimentation technique. When collecting fecal sample regarding the species, sex, age, breed, body condition, feeding system, housing condition, date of sampling, and origin of the animals were properly recorded on well prepared data sheet.

Statistical analysis

The total prevalence rate was calculated by dividing faecal positive result by the total animal examined. The data was filled into Microsoft Excel spread sheet, and was coded. The association between the prevalence of *Fasciola* with the potential risk factors was analyzed by using chi-square (χ^2) (Statistical Package of Social Sciences (SPSS, 2006) version 17 and logistic regression tests STATA version 11 were used to see the consequence).

RESULTS

This study showed that, the prevalence rate of fasciolosis was about 173 (43.3%) found to be positive for *Fasciola* egg. Prevalence of fasciolosis among age groups varied among the three age groups in the districts. The highest prevalence (45.8%) was in the young (<1 years), followed by 42.4% in the old (>2 years) of ages. The least prevalence was 39.7% in adult (1 to 2 years) (Table 1). However, this variation was not statistically significant ($P > 0.05$).

Effects of sex on the prevalence of fasciolosis

The prevalence of *Fasciola* in male sheep was 42.74 and

Table 1. The prevalence of ovine fasciolosis among age groups.

Age group	No. examined	No. positive	Prevalence rate (%)	Pearson χ^2	P-value ²
Young	216	99	45.8		
Adult	151	60	39.7	1.4	0.50
Old	33	14	42.4		
Total	400	173	43.3	-	-

Table 2. The prevalence of ovine fasciolosis on sex's variation.

Sex	No. examined	No. positive	Prevalence (%)	P-value	Person χ^2
Male	124	53	42.74		
Female	276	120	43.3	0.95	0.003
Total	400	173	43.3	-	-

Table 3. The prevalence of ovine fasciolosis based on body condition scoring.

Body condition	No. examined	No. positive	Prevalence (%)	Person χ^2	P-value
Good	144	41	28.5		
Medium	211	88	41.7	67.5	0.00
Poor	45	44	97.8		
Total	400	173	43.3	-	-

Table 4. The prevalence ovine fasciolosis in different districts.

District	No. examined	No. positive	Prevalence (%)	Person χ^2	P-value ²
Gondar	136	47	34.6		
Dembia	135	59	43.7	8.2	0.02
Gonder zurya	129	67	51.9		
Total	400	173	43.3	-	-

in female was 43.3% which was almost similar (Table 2) and the difference is not statistically significant. The prevalence was relatively lower in male (42.74%) than female (43.3), though, no statistically significant difference was observed ($P > 0.05$).

The effects of body condition on the prevalence of fasciolosis

Highly statistically significant difference ($P > 0.05$) in prevalence of fasciolosis was observed on animal body condition (Table 3). The highest prevalence (97.8%) was depicted in poor body condition and the least 28.5% was observed in animals with good body condition. The prevalence was 41.7% in medium body condition of sheep.

Prevalence of fasciolosis among the three districts

Significant variation ($P < 0.05$) was shown on the

prevalence of fasciolosis among the three districts (Table 4). The highest prevalence of fasciolosis was recorded in Gondar Zuria districts (51.9%), followed by Dembia (43.7%) and lowest in Gondar town (34.6%).

Prevalence of fasciolosis during the study period

Significant difference ($P > 0.01$) was illustrated on the prevalence of fasciolosis among the different months and the highest prevalence was observed in December (33.7%) and the least in February (7.9%) depicted in Table 5.

DISCUSSION

Fasciolosis is a wide spread ruminant health problem causing huge direct and indirect loss in Ethiopia. In this study, the overall prevalence of ovine fasciolosis was 43.3% and the highest prevalence of *Fasciola* was observed

Table 5. The prevalence rates of ovine fasciolosis in the study period.

Month	No. examined	No. positive	Prevalence (%)	Person χ^2	P-value ²
December	136	65	33.7		
January	121	42	30		
February	32	18	7.9	8.20	0.00
March	64	28	15.8		
April	47	20	11.6		
Total	400	173	43.3	-	-

observed in animals with poor body condition, and the least in animals with good body condition which agree with previous report of Mohammed (2010), which was reported to be 49.7% in Kombolcha; Molalegn et al., (2010) reported 49.1% in and around Dawa-Cheffe, Kemissie; and Yilma (1995) reported 49.9% in Holeta. However, the present result was lower than the reports of Michael (2004) who reported 56.3% from upper Awash river basin and Michael (2003) who reported (51%) from Debre Zeit. Ahmed et al., (2007) reported 13.2% prevalence in the Awash river basin which was the lowest prevalence rate as compared to the aforementioned findings. The variation in prevalence among the different studies might be due to differences in climatic condition and agro-ecological zone for the development of the snail intermediate hosts (Yilma and Malone, 1998). The reason may also be seasonal fluctuation, level of nutrition, method of diagnosis, and increasing trend of animal deworming by farmers.

This might be associated with the apparent inability of the host to resistant disease and vulnerable to parasitic disease. In this study, sex did not show significant variation on the prevalence of *Fasciola*, similar finding was shown by Daryani et al. (2005). Sex does not show any attribution for the prevalence of *Fasciola* rather mainly as altitude, rainfall and temperature and livestock management system.

In this study, the prevalence of *Fasciola* was found different among months. The highest *Fasciola* prevalence was in December which was 33.7%, while the lowest prevalence 7.9% was in February. These might be due to the difference in temperature, moisture, humidity, and soil that might affect the multiplication of intermediate host snails (Urquhart et al., 1996). However, an accurate description of seasonal occurrence requires long-term epidemiological investigation over several years.

The prevalence of *Fasciola* was higher in Gondar Zuria districts followed by Dembia and Gondar, respectively. This was due to the fact that three districts have almost similar climatic condition and the difference was most probably due to the presence of small water sites (springs/streams), the agro-ecology of Gondar town showed a great variation and waterlogged areas are suitable and needed for *Fasciola* to perpetuate (Yilma and Malone,

1998).

RECOMMENDATIONS

Since the study duration was only for five month in North Gondar Zone, 43.3% prevalence rate was recorded. The results of this study indicate that fasciolosis is one of the major problems in sheep in the study area that inflicts remarkable direct and indirect economical losses. Therefore, the recommendation of this study is that ecology and biology of the intermediate host should be conducted, strategic use of anthelmintics should also be administered to reduce pasture contamination with fluke eggs, community awareness should be created, and finally, the swampy areas should be well drained.

ACKNOWLEDGEMENTS

The authors would like to thank those working in Gondar town restaurants for their collaboration in collecting data during the study period. The authors would also like to acknowledge the host institution, Hawasa University, for her financial support and offering all the necessary equipments and facilitates during the manuscript write-up.

REFERENCES

- Abebe R, Fufa A, Mulugeta AH, Solomon M, Bekele M, Alemayew R (2010). Prevalence, Financial losses due to liver condemnation and evaluation of a simple sedimentation diagnostic technique in cattle slaughtered at Hawass Municipal Abattoir. *Ethiop. Vet. J.* 14(1): 39-51.
- Ahmed E, Makuirchirik F, Juw assorn S, Koonawooththin S, Pongs AJ (2007). Prevalence of *Fasciola* species infections of sheep in the Middle Awash River Basin, Ethiopia. *Southeast Asian J. Trop. Med. Public Health* 38:51-52.
- Central Statistical Agency (CSA) (2003). Livestock resources and production Statistics in Ethiopia. Federal Democratic Republic of Ethiopia Agricultural Sample Survey for 2003: Report on Livestock and Livestock Characteristics. *Statistical Bulletin. Volume II.*
- DACA (2006). Guideline for the Regulation of Promotion and Advertisement of Drugs, 2nd ed. Addis Ababa, Ethiopia. pp. 29-35.
- Daryani A, Alaei R, Arab R, Sharif M, Dehghan MH, Ziaei H (2005). Prevalence of liver fluke infection in slaughter animals in Ardabi Province, Northwestern Iran. *J. Anim. Vet. Adv.* 5:408-411.
- Mbaya AW, Shingu P, Luka JA (2009). Retrospective Study on the

- Prevalence of *Fasciola* Infection in Sheep and Goats at Slaughter and Associated Economic Losses from Condemnation of Infected Liver in Maiduguri Abattoir. Niger. Vet. J. 31(3):224 – 228.
- Michael A (2004). Infection prevalence of ovine fasciolosis in irrigation scheme along the Upper Awash River Basin and effects of strategic antihelminthic river treatment in selected upstream areas. Msc. Thesis, School of Graduate Studies, Addis Ababa University, Department of Biology. p 21.
- Micheal GM (2003). Treatment and Control of liver fluke in sheep and cattle. Technical notes, November 2003, West mainly roads, Edinburgh. pp. 34-45.
- Mohammed S (2010). Prevalence and economic importance of ovine fasciolosis in and around Kombolcha. DVM, Thesis, FVM, Gondar University, Ethiopia. p 16.
- Molalegn B, Nuradis I, Nahili A (2010). Study on prevalence of ovine fasciolosis in and around Dawa Cheffa, Kemissie. Afr. J. Agric. Res. 5(21):2981 – 2985.
- NGZARDO, North Gondar Zone Agricultural and Rural Development Office (2009). Annual Report of North Gondar Zone Cooperative Office.
- Phiri AM, Phiri IK, Sikasunge CS, Monrad J (2005). Prevalence of fasciolosis in Zambia cattle observed at selected Abattoir with emphasis on age, sex, and origin. J. Vet. Med. 52:414-416. www.blackwell-synergy.com.
- SPSS (2006). SPSS 15.0 for Windows Evaluation. Version Release 15.0.0 (6 Sep 2006).
- Thrusfield M (2005). Veterinary Epidemiology. 2nd ed. UK: Black Well Science. p 180.
- Urquhart M, Armour J, Duncan AM, Dunn AM, Jennings FW (1996). Veterinary Parasitology, 2nd ed. BlackWell Science, Scotland. p 41-60.
- Yilma J (1995). Study on ovine fasciolosis and other Helminth parasites at Holleta. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia. p 45.
- Yilma JM, Malone JB (1998). A geographic information system for cost model for Strategic control of fasciolosis in Ethiopia. Vet. Parasitol. 14:1-25.
- Yosef S (1993). Prevalence of Ovine Gastrointestinal Helminths in and around Asela. Addis Ababa University, DVM Thesis, Faculty of Veterinary Medicine. Deber Zeit, Ethiopia. p 47.