

Full Length Research Paper

Fasciolosis: Abattoir prevalence and severity of liver lesions in sheep slaughtered at Debre-Birhan Municipal Abattoir, North East Ethiopia

Biniam Tsegaye* and Bewket Gebeyehu

Haramaya University, College of Veterinary Medicine, P.O.Box 138, Dire Dawa, Ethiopia.

Accepted 19 March, 2015

A cross sectional study was conducted to determine the prevalence and severity of liver lesions in sheep slaughtered at Debre-Birhan Municipal Abattoir, North East Ethiopia. From the total of 384 sheep examined during post mortem examination, 173 (45.05%) were found to be infected with fasciola. *Fasciola hepatica* was found to be the most prevalent (33.33%) liver flukes species affecting sheep slaughtered in the study area followed by *Fasciola gigantica* (18.49%) and mixed species (7.29%). A statistically significant association ($p < 0.05$) was found between the age groups and among the different liver lesions; but there was no statistical significant variation ($p > 0.05$) between sexes and the study months. Finally, strategic application of anthelmintics at appropriate time of the year is recommended to decrease the prevalence in the study areas.

Key words: Abattoir prevalence, ovine fasciolosis, liver lesions, Debre-Birhan.

INTRODUCTION

Ethiopia with its great variation in climate and topography has the largest livestock population in Africa. There are approximately 44,318,877 cattle, 23,619,720 sheep, 23,325,113 goats, 6 million equine, 2.3 million camels and 43 million poultry (CSA, 2008). Livestock are an important and integral part of the farming system in Ethiopia. Apart from being a source of high quality protein, they also contribute to the economic welfare of the people by providing hides, skin, power traction for agricultural purpose and fertilizer for increasing productivity of small holding (Minjaw and Mcleod, 2003). Ethiopian livestock productivity, despite its huge population size remains marginal due to different constraints where disease stands in the first line (Gryseels, 1988).

Fasciolosis caused by *Fasciola hepatica* and *Fasciola gigantica* is the major disease of sheep that poses important economic loss due to mortality, liver condemnation, reduce production and expenditure for anthelmintics. A financial loss due to ovine fasciolosis alone was estimated at 48.8 million per year of which 46.5% is due to mortality, 48.8% is due to loss of

productivity and 4.7% is due to direct loss from liver condemnation (Ngagezize et al., 1993). Areas or sites with seasonally flooded pastures, slowly flowing waterways and bank of rivers are among the conducive environment for breeding of snails. This snail born trematode infection is one of the major diseases contributing loss in productivity of livestock industry in Ethiopia (Okewole et al., 2000). In Ethiopia, *F. hepatica* is wide spread in area within an altitude of 1800 to 2000 m.a.s.l, while *F. gigantica* appears to be the most common species in the areas below 1200 m.a.s.l and mixed species co-exist in the areas with an altitude ranging between 1200 to 1800 m.a.s.l (Graber, 1975).

Most studies of fasciolosis in Ethiopia were conducted mainly in cattle. Studies conducted on liver flukes of ovine (Getachew, 1987) indicate the importance of the parasites as a cause of impaired productivity. However,

*Corresponding author. E-mail: bintse2@gmail.com. Tel: +251-912-035571, +251-25-5-530334.

nationwide studies have never been carried out to determine the distribution of ovine fasciolosis. In addition, most previous studies in Ethiopia were based on corpological examination, which are less sensitive to identify the species of liver fluke. As a result, there is a paucity of information and there is no comprehensive study on ovine fasciolosis. Therefore, the current study was conducted to determine the prevalence and species of fasciola in sheep slaughtered at Debre-Birhan municipal abattoir, also to associate the severity of liver lesions with fasciola infection.

MATERIALS AND METHODS

Study area

This study was conducted at Debre-Birhan municipality abattoir. Debre-Birhan is the capital of North Shoa Zone located at a distance of 130 Km Northeast of Addis Ababa at a latitude 39°E and a longitude 10°N and at an altitude of about 2780 m.a.s.l in Amhara National Regional State. The area is mountainous, dissected by rivers and streams. The grazing lands around this area are drained by streams and pocketed by water logged (marshy) areas. The area has bimodal rainfall consisting of long rainy season "Kiremt" covering from June to September and short rainy season "Belg" extending from February to March. The annual rainfall of the area is 956 mm and the average minimum ambient temperature is 12.6°C with the range of 6.3 - 18.8°C and the relative humidity of 59.6% (CSA, 1998).

Study animals

The study animals were local breeds of sheep presented to Debre-Birhan municipality abattoir for slaughter purpose. Both sex and age groups were considered in the study.

Study design and sample size determination

A cross-sectional study type was conducted to determine the prevalence of ovine fasciolosis. The sample size required for the current study was determined according to the standard technique of sample size determination given by Thursfield (1995):

$$N = \frac{1.96^2 [P_{exp} (1-p_{exp})]}{D^2}$$

Where N is the required sample size, P_{exp} was the expected prevalence and D is the desired absolute precision. Since there were no previous researches done on the study site, an expected prevalence of 50% was taken to give a total of 384 animals by considering a 5% absolute precision and at 95% confidence level. The sample units were selected using simple random

sampling method from those animals brought for slaughtering.

Study methodology

Ante-mortem examination

During ante-mortem examination, detail information regarding sex, age and body condition of the sheep were recorded. Age estimation was done based on teeth pair according to Gatenby (1991).

Post mortem examination

During post mortem examination, liver was examined thoroughly and systematically inspected carefully for the presence or absence of adult fasciola species and characterization of liver lesion were done. After visual observation and palpation of the liver, sharp incision was made on the surface of liver through the major bile ducts to the parenchyma. The exposed bile ducts were squeezed and examined for the presence of adult flukes (Urquhart et al., 1996).

Species identification and characterization of liver lesion

Species identification of the affected liver was made based on size parameters and morphological feature for fasciola species identification given by Soulsby (1982). Affected liver was grouped into three categories based on liver lesion intensity, that is: lightly affected, moderately affected and severely affected liver as described by Ogunrinade and Ogunride (1980).

Data management and analysis

The data were entered into Microsoft excel spread sheets and were analyzed using STATA (version 11) statistical software package. The association of infection with the different variables was analyzed using χ^2 test. A statistically significant association between variables is considered to exist if the calculated p-value was less than 0.05 with 95% confidence level.

RESULTS

This study indicates that out of 384 slaughtered sheep, 173 (45.05%) were found to be infected with fasciola, where the association of the different study variables with respect to the prevalence is shown in Table 1.

Out of 173 infected livers, 81 (46.82%) were lightly affected, 47 (27.17%) were moderately affected and 45 (26.01%) were severely affected and there was a statistical significant variation ($p < 0.05$) among the liver lesions. The prevalence among the fasciola species was found to be 100 (57.80%) with *F. hepatica*, 45 (26.02%) with *F. gigantica* and 28 (16.18%) with mixed species.

Table 1. Prevalence of ovine fasciolosis by month, sex, age and body condition of the animals in the study sites and their statistical significance.

Variable		Animals examined	No. of positive	Prevalence (%)	χ^2	p-value
Month	November	102	42	41.18	1.0595	0.787
	December	93	43	46.24		
	January	115	52	45.22		
	February	74	36	48.65		
Sex	Male	226	98	43.36	0.6331	0.426
	Female	158	75	47.47		
Age	Young	294	122	41.50	6.4057	0.000
	Adult	90	51	56.67		
Body condition	Medium	354	168	47.46	10.5919	0.001
	Good	30	5	16.67		
	Total	384	173	45.05		

There was a statistical significant difference ($p < 0.05$) among the fasciola species.

DISCUSSION

The prevalence of ovine fasciolosis in the study area was 45.05%. It is lower as compared to that of the previous study by Yadeta (1994) who reported the prevalence of 84% at Western Shewa, and Yilma (1985) who reported a prevalence of 82.78% at Holeta. This great variation is due to the ecological change which was attributed to drying of the snail habitat, an increase in the awareness of the people about the disease, and the establishment of veterinary clinics in different districts. The present study was higher as compared to the previous study of Wassie (1995) who reported 15.97% at Nekemte. However, this is due to ecological and climatic difference among the localities.

The result of the present study revealed that there was no statistical significant association ($p > 0.05$) among the study months. This agrees with reports of Yadeta (1994) and could be due to constant climate and rainfall among the months. There was also no statistical significant association ($p > 0.05$) between sexes. This result is comparable to the reports of Wassie (1995). It might be due to the grazing of both sexes in similar fasciola contaminated pastures. The prevalence between different age groups of animals was found to be statistically significant ($p < 0.05$). The highest prevalence was seen in the adults (56.67%) and relatively lower (41.50%) in the young animals. This result is in agreement with that of Wassie (1995). This variation is associated with the fact that young animals are not usually allowed to go far with adults for grazing. As such, the chance of exposure to the infective Metacercariae was very low as compared to adult animals. The study also showed a significant

association ($p < 0.05$) among animals of different body conditions. The higher prevalence was observed in the medium body conditioned animals (47.46%) as compared to good body conditioned animals. This variation may be due to management system. In the medium body conditioned animals, management system is extensive which leads to higher chance of exposure to fasciolosis and in good body condition the management system is intensive which leads to reduction of the chance of exposure to fasciolosis.

The current study revealed a statistically significant association ($p < 0.05$) among fasciola species where a prevalence of 57.80% was recorded for *F. hepatica*, 26.02% for *F. gigantica* and 16.18% for mixed species. This result is in agreement with the reports by Wassie (1994) and Yilma (1985). This variation was due to altitude and climatic condition where *F. hepatica* was the most predominant fasciola species in highland areas. In the present study, the results of the assessment of liver lesions were found to be statistically associated ($p < 0.05$) with liver infestation. The extent of the liver lesion may be attributed to the number of immature fluke migrating in the liver parenchyma, the adult fluke living and wandering in the bile duct, the level of immunity of the host and the number of metacercariae ingested. This result was similar with that of the previous studies reported by Wassie (1995) and Adem (1994).

REFERENCES

- Adem A (1994). Prevalence of bovine and ovine fasciolosis; A preliminary survey around Ziway region. DVM Thesis, FVM, Addis Ababa University, Debre Zeit, Ethiopia. p. 15.
- CSA, Central statistical Authority (2008). Federal Democratic Republic of Ethiopia; Agricultural sample

- enumeration statistical abstract, Ethiopia.
- CSA, Central Statistics Authority (1998). In Ethiopia livestock estimate, Vol. I, Bulletin, No. 52, Addis Ababa, Ethiopia.
- Gatenby RM (1991): Sheep in The tropical agriculturalist London and Basingstock, MACILLAN education Ltd., ACCT, pp.7-8.
- Getachew T (1987). Survey of fasciolosis in cattle, sheep and goats slaughtered at Addis Ababa Abattoir, IPB research report, AAU, Ethiopia. 3: 10-11.
- Graber M (1978). Helminthes and Helminthosis of domestic and wild animals in Ethiopia. *Revue Elev. Med. Vet. Pays Trop.* 1:13-95.
- Gryseels G (1988). Role of live stock on mixed small holder farm in Ethiopia highlands, A case study from the Basona Worena near Debre- Birhan. Phd dissertation, Agricultural University, wageingen, the Nether lands.
- Minjaw B, McLeod A (2003). Tick borne disease and poverty center for tropical Veterinary Medicine, University of Edinburgh, UK.
- Ngategize PK, Tekeleye B, Getachew T (1993). Financial losses caused by ovine fasciolosis in Ethiopian highlands. *Trop. Anim. Health. Production.* 23: 155-167.
- Ogunrinade A, Ogurnride I (1980). Economic importance of Bovine fasciolosis in Nigeria, *Trop. Anim. Heath Prod.*, 12: 150-160.
- Okewole EA, Ogundip GA, Adejinmi JO, Olaniyan AO (2000). Clinical evaluation of three chemophylatic Regimes against ovine Helminthosis in fasciola endemic from In Ilbadan ,Nigeria ,Israel. *J. Vet. Med.*, 56(1): 15-28.
- Soulsby EJ (1982). *Helminthes, Arthropods and protozoa of domesticated animals* 7thed. Bailler Tindall, London, pp. 44-50.
- Thursfield M (1995). *Veterinary Epidemiology*, Second edition, UK, black well science Ltd.
- Urquhart GM, Armour JD, Duncan JL, Dunn AM, Jennings FW (1996). *Veterinary Parasitology* 2nd ed. Black well Science, London. pp: 102-113.
- Wassie M (1995). Prevalence of ovine and bovine fasciolosis: a preliminary survey in Nekemte and its surrounding areas, DVM Thesis, FVM, Addis Ababa University, Debre zeit, Ethiopia. p. 30.
- Yadeta B (1994): Epidemiology of bovine and ovine fasciolosis and distribution of its snail intermediate host in western Shewa, DVM Thesis, FVM, Addis Ababa University, Debre zeit , Ethiopia. p. 35.
- Yilma J (1985): Study on ovine fasciolosis and other helminthes parasites at Holeta, DVM Thesis, Addis Ababa University, Debre zeit, Ethiopia. p. 45.