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Prevalence of Ovine Fasciolosis and its Associated Risk Factorin and Around Debre Elias District, East Gojam, North West of Ethiopia

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Abstract: A cross sectional study was conducted to determine the prevalence and risk factors of ovine fasciolosis in and around Debre Elias Woreda, East Gojam, North West of Ethiopia from October, 2013 to April, 2014. Parasitological examination of fecal samples collected from 384 sheep by using sedmentation method revealed an overall fasciolosisprevalence of 44.3%. The results demonstrated in three PAs that *Fasciola*infection was higher in yesaser (45.7%) than yemezegn and yekegat (43.2%) and (44%), respectively, but there was no statistical significance ($p>0.05$). The prevalence of ovine fasciolosis for the different age groups were found to vary insignificantly ($p>0.05$) and also infection rate between male and female sheep were found insignificant ($p>0.05$). Infection rates for sheep with poor body condition (47.6%) were higher than sheep with good body condition (36%). With regard to the seasonal factors, the highest infection rate was observed during the Spring (66.4%) and lowest infection rate was recorded during Winter (27.3%) and Autumn (34.2%). There was a significant difference ($P<0.05$) for body condition and season for the occurrence of ovine fasciolosis. The result of the present study indicated that fasciolosis is a highly prevalent sheep disease in the study area that could potentially hinder productivity of sheep and tremendously affect the rural economy at large. To control the disease in this area, appropriate preventive control strategies have to be designed to reduce the impact of the disease on sheep production.

Key words: Coprology · Debreelias · Fasciola · Prevalence

INTRODUCTION

Ethiopia has the largest livestock population in Africa, which plays an important role in the lives of its people. It owns huge number of small ruminants, about 26.1 million sheep and 21.7 million goats [1]. Even though, the productivity is low as a result of disease, malnutrition and other management problems. Parasitism is one of the major bottle necks to livestock development in the tropics [2]. Among many parasitic problems of farm animals, fasciolosis caused by *Fasciola hepatica* and *F. gigantica*, is one of the most prevalent helminthes infections of ruminants in different parts of the world including Ethiopia [3].

Sheep and cattle are the most important definitive hosts of *F. hepatica* and *F. gigantica*. They are responsible for wide spread morbidity and mortality in sheep and cattle characterized by weight loss, anaemia, hypoproteinaemia and unthriftiness. It causes a substantial economic loss which includes; death, loss in carcass weight, reduction in milk yield, condemnation of affected liver, decline production and productive performances, predispose animals to other disease and cost of treatment expense. Both *F. hepatica* and *F. gigantica* type of liver flukes cause severe loss in parts of Ethiopia where suitable ecological conditions for the growth and multiplication of intermediate host snails are found [4].

In Ethiopia *F. hepatica* and *F. gigantica* infections occur in areas above 1800 meter above sea level and below 1200 m.a.s.l respectively which has been attributed to variations in the climatic and ecological conditions such as rain fall, altitude, temperature and livestock management system [5].

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The presence of fasciolosis due to *F. hepatica* and *F. gigantica* in Ethiopia has long been known and its prevalence and economic significance have been reported by several workers [6]. Areas with seasonally flooded pastures, grazing areas of lack shores, slowly flowing water ways and banks of rivers are among the conducive environment for breeding of snail vectors of fasciolosis [7].

Diagnosis is based primarily on clinical signs and seasonal occurrence in endemic areas. But previous history of fasciolosis on the area or identification of snail habitats; postmortem examinations, hematological tests and examination of faeces for fluke eggs are useful.

Coprological analysis is still commonly employed to diagnose fasciolosis despite the fact that eggs cannot be detected until after the latent period of infection, when much of the liver damage has already occurred [8]. Even though the prevalence of ovine fasciolosis is investigated in different parts of Ethiopia; yet there is no research conducted that shows prevalence of ovine fasciolosis and its associated risk factors in and around Debre Elias district.

Therefore the objectives of this study were:

- To estimate the prevalence of ovine fasciolosis in and around Debre Elias district.
- To assess the risk factor of ovine fasciolosis in the study areas.

MATERIALS AND METHODS

Study Area: A study was carried out in Debre Elias district in west Amhara region, Northwest part of Ethiopia. The climatic conditions alternate between a long summer rain fall season (June-September) and a winter dry season (December-March) with a mean annual rain fall of 1200-1600mm. The land is covered by different vegetations types namely savanna grass land, forest riverian and bush lands [9]. Geographically, the study area is located between 10 14'N 10 45'N and 37 29' E 37 38' E. The mean temperature is 12-20°C and the altitude ranges from 1400-2990m.a.s.l. Agriculture is the only economic sector in the study area employing nearly 100% of the labour force. The main agricultural activities currently practiced include irrigation (Modern and tradition), animal production and crop production. Mixed farming and crop production activities hold 90% of the total agricultural activities. The major agricultural products seasonally harvested include Sorghum, Wheat, Maize, Linseed and other Legume groups.

Study Animals: During the study period, sheep of all age and sex groups were randomly selected both from extensive and intensive type of management systems for fecal examination to determine the prevalence of ovine fasciolosis in and around Debre Elias district. Based on 2010 census conducted by districtBureaue of Agricultural and Rural Development Office, the total livestock population in the district is about 161,945, out of these 66,045 sheep, 33,900 goats, 20,000 equines and 41,000 cattle.

Study Design: A cross sectional study was conducted to determine the prevalence of ovine fasciolosisand its associated risk factor in and around Debre Elias district from October, 2013 to April, 2014.

Sample Size Determination: The sample size required for this study was determined based on sample size determination in random sampling for infinite population using expected prevalence of ovine fasciolosis 50% and 5% desired absolute precision according to Thursfield [10].

$$n = \frac{1.96^2 Pexp\ (1\text{-}Pexp)}{d^2}$$

where,

n = Required sample size,
Pexp = Expected prevalence,
d = Desired absolute precision

Therefore, based on the above formula the total sample size were calculated 384 animals. These animals were considered for faecal examination to detect fasciola infection in ovine.

Study Procedure: Fresh faecal samples were collected directly from rectum or during defecations using clean universal bottles. Each sample was lebled with age, sex, body condition and place of the origin. The collected samples were subjected to qualitative coprological examination using sedimentation technique. For the trematodes egg identification a drop of methylene blue was added [11]. Age was estimated using dental growth and eruption [12]. Animals with age less than one year

were considered as young, where as those greater than one year were considerd as adult. The body condition were groupd in to two and animals that score 0-2 and 3-5 are classified as poor and good body condition, respectively according toMoARD [9].

Data Analysis: Data obtained from coprological examination was recorded on Microsoft exel and analyzed using SPSS version 20 statistical package. Descriptive statistics were used to determine prevalence of *Fasciola* infection in ovine in and around Debre Elias district and chi-squre test was used to assess for the presence of association of risk factors with the prevalence of the parasite. All statistical tests were conducted using SPSS version 20 software and were considered significant if the p value is less than 0.05.

RESULTS

Among a total of 384 examined sheep fecal samples, 170 samples were found positive for *Fasciola*eggs with an overall prevalence of 44.3% (Table 1) The prevalence of fasciolosis recorded in the three Peasant Associations (PAs) were 45.7%, 43.2% and 44.0% in yesaser, yemezegn and yekegat, respectively. As indicated in Table 1 this difference in prevalence was not statistically significant ($p>0.05$).

Influence of age on the prevalence of ovine fasciolosis revealed that there was higher prevalence rate (44.7%) in young and lower prevalence rate in animals of adult aged (44.1%). But there was no statistically significant difference on the prevalence of ovine fasciolosis based on age ($p>0.05$) as indicated in Table 2.

The prevalence of fasciolosis in male and female sheep was 44.4% and 44.2%, respectively. Although the prevalence was relatively higher in male sheep as indicated in Table 3. The difference was not statistically significant ($p>0.05$).

Prevalence of fasciolosis on poor body condition animals was 47.6%. However, animals with good body condition showed prevalence of 36%. As described in Table 4. Significant difference ($P < 0.05$) was observed among body condition of the study animals.

Prevalence of fasciolosis varied seasonally. Highest prevalence was observed in spring (66.4%). Meanwhile, low prevalence was observed in autumn with value (34.2%) and winter (27.3%). As indicated in Table 5. Significant difference ($P < 0.05$) was observed among seasons in the study animals.

Table 1: Prevalence of ovine fasciolosis on the basis of origin

Origin	No. Examined	No. positive	Prevalence (%)	x^2(p- value)
Yesaser	127	58	45.7	0.168(0.920)
Yemezegn	132	57	43.2	
Yekegat	125	55	44.0	
Total	384	170	44.3	

Table 2: Prevalence of ovine fasciolosis on the basis of age group

Age groups	No. Examined	No. positive	Prevalence(%)	x^2(p-value)
Young	94	42	44.7	0.008(0.927)
Adult	290	128	44.1	
Total	384	170	44.3	

Table 3: Prevalence of ovine fasciolosis on the basis of sex

Sex	No. Examined	No. Positive	Prevalence(%)	x^2 (p-value)
Male	144	64	44.4	0.003(0.958)
Female	240	106	44.2	
Total	384	170	44.3	

Table 4: Prevalence of ovine fasciolosis on the basis of body condition

Body condition	No. examined	No. positive	Prevalence (%)	x^2(p-value)
Poor	273	130	47.6	4.291(0.038)
Good	111	40	36.0	
Total	384	170	44.3	

Table 5: Prevalence of ovine Fasciolosis on the basis of season

Seasons	No. examined	No. positive	Prevalence (%)	x^2(p-value)
Spring	146	97	66.4	48.071(0.000)
Winter	121	33	27.3	
Autumn	117	40	34.2	
Total	384	170	44.3	

DISCUSSION

Parasitological examination of fecal samples collected from 384 sheep revealed an overall fasciolosis prevalence of 44.3% in the study area. This finding wasin agreement with Tesfaheywet and Negash [13] who reported prevalence of 45.6 % in Oda Bultum Woreda. The overall prevalence of fasciolosis in thisstudy was higher than the previous studies done by Rahmto [14], Ahmed *et al*. [15] andHenok and Mekonnen [19] who reported the prevalence of 35%, 13.4%, 13.2% and 14.6% in Walisso, Nekemte, Awash and Hirna, respectively. While, it was lower than the one reported by Bitew *et al*. [17] in Kemisse (49%). This might be due to the differences in temperature, moisture, humidity, soil and other ecological factors of the study areas that could favor or disfavor the snail intermediate host and the parasites as well as the effort exerted towards the control of the parasite [7]. Prevalence rates and epidemiology of the disease varied significantly with locality and this might be attributed to the variation in the climate and ecological conditions [18].

Prevalence of fasciolosis in the different PAs of the study areas were no statistical difference (p> 0.05). It might be due to similarity of the altitude and other ecological conditions. Where,Yilma and Malone [5] suggestedaltitude to be one of the determinant factors for the difference in distribution of fasciolosis.

Younger animals showed higher prevalence than adult ones, however, the variation was not statistically significant (P>0.05). This might be because of both young and adult sheep wereequally grazed in the same pasture land. In contrast to the presentfinding, Ahmed *et al*. [15], Henok and Mekonnen [16] and Bitew *et al*. [17] reported higher prevalence in older sheep. While, Micheal [19] reported higher prevalence in younger animals possibly indicating that repeated exposure to fluke infestation might have led to the development of certain level of immunity in the adult animals as compared to younger ones, consequently impeding the establishment of parasitic infection.

The prevalence of fasciolosis with regard to sex was 44.4% and 44.2% in male and female animals, respectively. It washigher in male animals than in females, nevertheless it was not statistically significant (P>0.05). The absence of significant sex related differences was also reported by Ahmed *et al*. [15] and Bitew *et al*. [17]. The possible explanation for this could be owing to the virtually similar exposure status of the animals in grazing areas irrespective of their sex. It might also be that fasciolosiswasnot a disease directly related to animal reproductive system. Similar results have been reported by Argaw [20].

In the present study, higher infection rate of fasciolosis was recorded in sheep with poor body condition than good body condition animals. The prevalence was statistically significant (P<0.05). Similarly [17] also reported significantly higher (P<0.05) prevalence in sheep with poor body conditions than in those with good body condition. This signifiedthe importance of fasciolosis in causing weight loss. And this could be due to the fact that animals with poor body conditions are usually lessresistant and are therefore susceptible to infectious diseases [21].

The present study indicated that an infection rate of fasciolosis was significantly high in spring and low in autumn and winter (P<0.05). During the wet season (Spring), the amount of the rainfall flooding grazing area is high as compared to winter and autumn. It created a favorable condition for the development of the intermediate host (Snail) and the transmission of the diseases.In the current study, season wasfound to have statistically significant association (P<0.05) with the occurrence of fasciolosis. This finding wasin agreement with Urquhart *et al.* [7] and Micheal [19].

CONCULUSION

The result of the present study indicated that fasciolosiswasa highly prevalent sheep disease in the study area that could potentially hinder productivity of sheep and tremendously affect the rural economy at large.In this study, season and body condition of the animals were found to be important risk factors for the occurrence of ovine fasciolosis with the significance difference. However, it is increasingly evident that a proper evaluation of the epidemiology of fasciolosis is lacking. The relatively high prevalence reported in this study has clearly indicated lack of strategic control measures against the disease and also due to the wide marsh areas at grazing sit of animals.

Recomandations: Based on the aforementioned conclusion the following recommendations are forwarded:

- Strategic anthelmintic treatment with appropriate fluckcidal drugs should be practiced to eliminate the fluke burden of the host and minimize the pasture contamination by faecal egg shedding, thus interrupting the life cycle.
- Reduction in the risk of infection by planned grazing management especially during high outbreak months by the application of zero grazing (cut and carry).
- Further studies on epidemiology of fasciolosis of bovine should be conducted on the study area.
- Finally the farmer should be well educated and informed about importance of the disease control programmes and good management system.

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