Prevalence and Associated Risk Factors for Ovine Fasciolosis in Selected Areas of North Gondar, Ethiopia

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Abstract: A cross sectional study was carried out from November 2010 to March 2011 with the major objectives of determining the prevalence of ovine fasciolosis and assessment of risk factors in and around three towns of North Gondar zone (Gondar, Azezo and Tseda town). Purposive and simple random sampling technique was used to select the study areas and the study animals respectively. Fecal samples were collected from a total of 384 sheep of both age groups (young and adult), both sexes (male and female) and both body conditions (poor and good). Sedimentation technique was used for recovery of Fasciola eggs from freshly collected fecal samples. From the total number of 384 sheep examined, 189 were found positive for Fasciola eggs with an overall infection rate of 28.39%. There was no statistical significant difference recorded among the three towns of North Gondar zone (p=0.085, $\chi^2$ =4.9222) namely Gondar, Azezo and Tseda town. However, there was prevalence difference between them i.e. the highest prevalence in Azezo (36.36%) and the lowest in north Gondar town (24.59%) was recorded. Statistically difference was recorded in infection rate between sex (p=0.004, $\chi^2$ =8.3997) but no significant difference (p=0.896, $\chi^2$ =0.0172) was found between age groups. In addition, statistically significance difference (p=0.000, $\chi^2$ =26.9882) was recorded between body conditions. Finally, effective chemotherapy and appropriate vector control practice should be followed to overcome great economic lose in the study area.

Key words: Gondar • Ovine Fasciolosis • Prevalence • Sedimentation

INTRODUCTION

In Ethiopia, sheep are the dominant livestock providing up to 63% of cash income and 23% of food substance value obtained from livestock production. Endo-parasitic infection and management problems are known to be the main factors that affect productivity. The various species of gastrointestinal and pulmonary nematodes, trematodes and cestodes are known to be prevalent in Ethiopia [1].

Among the many parasitic problems of the domestic animals fasciolosis is a major disease which imposes direct and indirect economic impact on livestock production in ruminants which are the natural hosts for Fasciola [2]. Fasciolosis is an economically important disease of domestic livestock, in particular cattle and sheep and occasionally man. The disease is caused by digenean trematodes of the genus Fasciola, commonly referred to as liver flukes. The two species most commonly implicated, as the etiological agents of fasciolosis are Fasciola hepatica and Fasciola gigantica. In Ethiopia, the annual losses due to ovine fasciolosis were estimated to be 48.4 million Ethiopian Birr (1 US$ = 2.07 ETB) per year, of which 46.5, 48.8 and 4.7% were due to mortality, productivity (weight loss and reproductive wastage) and liver condemnation, respectively [1].

The egg passed out in feces hatch after about 9 days at optimal temperature (22-26 °C) releasing a motile stage which must locate and penetrate a lymnaeid snail within few hours. Further development in the snail is complex but lead to eventual release of many motile forms which attach to firm surface such as blades of grasses where they encyst to infective form which is called metacercariae. It ingested by susceptible host. The metacercariae release immature fluke in the small intestine which
migrate through the liver to the bile duct and sometimes the gall bladder, when mature, the fluke shed eggs which are passed out in the feces so continuing the life cycle. At temperature less than 10°C eggs passed out in the feces remains dormant until ambient temperature are higher before hatching. Breeding of snails and development of flukes in infected snails are also arrested at similar temperature. In dry conditions the survival of metacercariae on herbage is poor [3].

In Ethiopia, despite the huge economic losses in cured and wide distribution of fasciolosis in the country, significant control measures have not yet been developed at the national and regional level. Routine treatment of clinical illness is the norm rather than prevention of infection. More rational prophylactic programs based on local epidemiological information are needed for round fasciolosis control strategies in Ethiopia [4, 5]. Therefore, this study aimed to determine the prevalence of ovine fasciolosis in north Gondar and assess associated risk factors.

MATERIALS AND METHODS

Study Area Description: The study was conducted in Amhara National Regional State in and around three towns of North Gondar zone, which is located in Northwestern part of Ethiopia, located about 725km far from the capital Addis Ababa; at altitude of 12.3-13.8°N; longitude 35-35.7°E and latitude of 2, 200m above sea level. North Gondar zone has an estimated human population of 2,398,291 of which 201,958 are found in Gondar town in 23 kebeles. The livestock population of North Gondar is estimated to be 1,936,514 cattle (Exotic, cross and local), 524,083 sheep, 682,264 goats, 36,828 horses, 12,473 mules, 223,116 donkeys and 3,165,068 poultry. In general, the administrative zone is divided in to three main agro-climatic zones, highlands, mid high land and low land regions. The altitude ranges from 4,620 meters in the semen mountain in the North to 550 meters in western part and rainfall varies from 880 mm to 1,772mm with the average annual maximum and minimum temperatures are 22-30.7°C and 12.3°C-17.7°C respectively. The area characterized by two seasons, the wet season from June to September and the dry season from October to May [6].

Study Animals: The study animal included 384 local breeds of ovine of both sexes, which were selected from in and around the three towns of North Gondar Zone (Gondar, Azezo and Tseda town).

Study Design and Sampling Technique: A cross sectional study was carried out from November 2010 to March 2011 to determine the current prevalence of ovine fasciolosis around north Gondar (ii) to give appropriate treatment, control and prevention of the disease. The study areas (Gondar, Azezo and Tseda town) were purposively selected based accessibility and expected challenges while simple random sampling technique was employed to select the study animals.

Sample Size Determination: The required sample size were calculated based on Thrusfield [7] with 95% of confidence interval and at 5% desired precision with expected prevalence of 50%.

\[ N = \frac{(1.96)^2 \times p_{exp} \times (1-p_{exp})}{d^2} \]

where \( n \) =number of sample size, \( p_{exp} \) =expected prevalence, \( d^2 \) =Absolute precision

Therefore, based on the aforementioned formula 384 were considered in the study.

Study Methodology: Fresh fecal sample was collected directly from the rectum of sheep. The collected fecal samples were placed in screw cap bottles containing 10% formalin and transported to the Parasitology Laboratory of Gondar University for examination. In laboratory, the samples were processed by sedimentation technique and the eggs of Fasciola spp. were identified under compound microscope after staining the sample with 1% methyl blue [8].

Data Analysis: All raw data generated from this study were coded and entered in MS Excel database system. Using SPSS version 16.0 computer program, data were analyzed. Chi-square (2) test was used to determine the variation in infection prevalence between sex, age, body condition score and deworming history. Statistical significance was set at \( P < 0.05 \) to determine whether there were significant differences between the parameters measured between the groups.

RESULTS

Overall Prevalence: A total number of 384 sheep managed extensively from in and around the three towns of North Gondar zone were examined to determine the magnitude of ovine fasciolosis. Out of 384 fecal samples examined, 28.39% were positive for Fasciola egg (Table 1).
Table 1: The overall prevalence of Fasciola infection in ovine species

<table>
<thead>
<tr>
<th>Result</th>
<th>Frequency</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>275</td>
<td>71.61%</td>
</tr>
<tr>
<td>Positive</td>
<td>109</td>
<td>28.39%</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Prevalence of Fasciola infection in male and female animals

<table>
<thead>
<tr>
<th>Sex</th>
<th>Animal examined</th>
<th>Positive</th>
<th>Prevalence</th>
<th>X^2</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>129</td>
<td>69</td>
<td>54.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>146</td>
<td>40</td>
<td>27.4%</td>
<td>0.004</td>
<td>8.3997</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>109</td>
<td>28.39%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Prevalence of Fasciola infection in different age groups

<table>
<thead>
<tr>
<th>Age</th>
<th>Total</th>
<th>Positive</th>
<th>Prevalence</th>
<th>X^2</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>344</td>
<td>98</td>
<td>28.49%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>40</td>
<td>11</td>
<td>27.50%</td>
<td>0.0172</td>
<td>0.896</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>109</td>
<td>28.39%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Prevalence of Fasciola infection in different origin

<table>
<thead>
<tr>
<th>Town</th>
<th>Total</th>
<th>Positive</th>
<th>Prevalence</th>
<th>X^2</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azezo</td>
<td>110</td>
<td>40</td>
<td>36.36%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gondar</td>
<td>183</td>
<td>45</td>
<td>24.59%</td>
<td>4.9222</td>
<td>0.085</td>
</tr>
<tr>
<td>Tseda</td>
<td>91</td>
<td>24</td>
<td>26.37%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>109</td>
<td>28.39%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Comparison among body condition of animals with prevalence of Fasciola infection

<table>
<thead>
<tr>
<th>Body condition</th>
<th>Total</th>
<th>Positive</th>
<th>Prevalence</th>
<th>X^2</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>262</td>
<td>53</td>
<td>20.23%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>122</td>
<td>56</td>
<td>45.90%</td>
<td>26.9882</td>
<td>0.000</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>109</td>
<td>28.39%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assessment of Risk Factors: Sheep were examined for the prevalence of Fasciola infection with the risk factors of origin, sex and age and body condition. Samples were taken from both male and female animals, out of which 69 (34.85%) were male positive where as 40 (21.51%) were female positive. There was significance difference on the prevalence of Fasciola infection between the two sexes (Table 2). The age of the animal did not show significant association with prevalence of ovine fasciolosis in both age groups (Table 3). There was insignificant difference on the prevalence in the three towns of North Gondar zone (Table 4). There was significance difference in the prevalence of Fasciola infection between body conditions of the animals (Table 5).

DISCUSSION

The results of the present study had revealed the overall prevalence 28.39% of ovine fasciolosis which was comparable with Dinka [9] with the prevalence of 32.9% in and around Assela. The similarity in the prevalence of ovine fasciolosis in different region of the country might be due to the similarity of climatic conditions i.e. altitude, rainfall, temperature, humidity and management system of sheep.

The prevalence of ovine fasciolosis in the study area was greater than the prevalence 0.50% [10]in Iraq, 2.78% [11] in north India and 28.70% [12] in Iran and 3.1% [13] at Arusha, Tanzania in sheep. The difference may be due to environmental, poor creation awareness, little attention for prevention and control of fasciolosis.

In other way the prevalence of ovine fasciolosis in the study area was lower as compared to other report of 51% [14] in Debre-zeit, 82.78% [15] in Holetta and 54.1% in and around kombolcha. Such huge gap occurred due to the presence of conducive ecological factors for the intermediate host (snail) and the parasite Fasciola, the feature of land escape has good drainage system and also the presence of good management systems, expansion of animal health extension, veterinary service opening at kebele or peasant association level and intervention of private drug shops. This enabled farmers to have more access for disease control and intervention. Prevalence of ovine fasciolosis in the study area was also higher than 15.8% which was reported by Musa [16].

The infection rate between male 69(34.85%) and female 40(21.51%) sheep was significant (p<0.05). There was higher prevalence rate in male animals than females. This might be related to management system with the longer exposure of males out door when females were kept indoor at the end of pregnancy and at the beginning of lactation. Similar results had been reported by Musa [16] in and around Bahir Dar. Moreover, the results were contraindicated from the results of Grabber and Dans [17].

The occurrence of ovine fasciolosis in and various towns of North Gondar zone did not show significant difference (p>0.05). This might happen because the three different towns (Gondar, Azezo and Tseda town) had similar altitude, marshyness of the land, temperature and management system of sheep.

The prevalence of ovine fasciolosis among different body conditions was statistically significant (p<0.05) in the study area i.e. poor body condition animals were more infected than that of good body condition. This finding is supported by Ahmed et al. [18] and Bitew et al. [19] conducted on ovine fasciolosis as well were in line with the current finding. The reason behind that might be attributed to over grazing of both poor and good condition animals in differently contaminated pasture lands. This signifies the importance of fasciolosis in...
causing weight loss and it is the characteristic sign of the disease. Chronic fasciolosis is the common form of the disease in sheep and one the characteristic sign is weight loss or emaciation. Emaciated animals do not produce milk and reproduce [20, 21].

The study showed non -significantly (P>0.05) prevalence of ovine fasciolosis in young and adult ages. The results indicated that young sheep is similarly receptive as adult age of sheep. Such similarity of prevalence of ovine fasciolosis in two age groups might be due to that of animals less than one year were allowed to go with adult animals for grazing; as a result their chance of exposure to infective metacercariae was similar to that of adult animals.

CONCLUSION

The occurrence of fasciolosis is depending on the presence or the absence of suitable conditions for intermediate host and Fasciola. The present study indicates that ovine fasciolosis is distributed with prevalence of 28.39% in the study area. Based on the aforementioned conclusion, using effective chemotherapy and appropriate vector control to reduce the economic impact of fascoilosis in the study area were recommended.

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REFERENCES


