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Prevalence of Ovine Fasciolosisin Dembecha District, Northwest Ethiopia

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Abstract: A study was conducted from November, 2013 to March, 2014 to determine the prevalence of ovine fasciolosis in Dembecha district, West Gojjam zone. A total of 384 fecal samples were randomly collected directly from the rectum of individual animals. Parasitological investigation was performed using sedimentation technique. From a total of 384 coprologically examined sheep, 70 animals were found positive for fasciolosis with an overall prevalence of 18.2%. The difference in the prevalence of fasciolosis in Yemehel, Leget and Seregela was not statistically significant (P> 0.05) with prevalence rate of 23.4%, 16.4% and 14.8%, respectively. The prevalence rate of fasciolosis in adult sheep (31.0%) was higher than in young sheep (10.5%) and the difference was statistically significant (P< 0.05). The difference in prevalence of fasciolosis in poor, medium and good body conditions was statistical significant (P< 0.05) with overall prevalence of 35.8%, 14.0% and 6.2%, respectively. There is also significant difference (P< 0.05) between male and female sheep with over all prevalence of 11.8% and 24.2%. It was concluded that ovine fasciolosis was prevalent, thus posing major economic loss in the study area. Hence, control strategies targeted on the parasite and the intermediate hosts as well as implementation of appropriate grazing management in the study area are warranted.

Key words: Fasciolosis · Prevalence · Sheep · Dembecha · Ethiopia

INTRODUCTION

Ethiopia possess the largest livestock population in Africa, with an estimated population of 7.8 million equines, 1 million camels, 47.5 million cattle, 39.6 million chickens, 26.1 million sheep and 21.7 million goats [1]. Small ruminants play a significant role in maintaining household stability by providing meat, milk, skin and wool, generate cash income and play traditional social and religious roles [2]. Among the small ruminants in Ethiopia, sheep are the dominant livestock, providing up to 63% of cash income and 23% of the food subsistence value obtained from livestock production [3]. Regardless the large size of the sheep population in the country and the huge potential therein; the productivity per animal and the contribution of this sub-sector to the national economy is relatively low due to multitude of constraining factors including malnutrition, diseases, improper health care and other management problems [4].

Infectious and parasitic diseases are common traits that affect productivity. Parasitic infections pose a serious health threat and limit the productivity of livestock due to the associated morbidity and mortality [5]. Vast numbers of parasitic diseases are incriminated to play a detrimental role in hampering small ruminant production leading to serious economic loss [6]. Gastro-intestinal helminthosis is considered as one of the major parasitic problem that constrained livestock improvement programs in Ethiopia. One of the helminthosis that causes immense direct and indirect losses especially in domestic ruminates is fasciolosis [7].

Fasciolosis is one of the most prevalent helminthes infections of ruminants in different parts of the world. Particularly in its sub clinical forms where it has been shown to reduce growth rates, feed conservation, fertility and milk yield [8]. Fasciolosis is caused by digeneantrematode of the genus *Fasciola*consisting of two species usually implicated in causing the disease

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namely *F. hepatica* and *F. gigantica.* Ruminants are the natural hosts for *Fasciola*among which sheep and cattle suffer the highest infection [9, 10]. Fasciolosis is an economically important disease leading to huge financial losses due to morbidity and mortality and also due to liver condemnation thereby contributing to loss in productivity of livestock industry in Ethiopia [11]. Ahmed *et al*. [11] reported an annual loss of 48.4 million Ethiopian Birr per year due to ovine fasciolosis.

Considerable work has been done on the prevalence and economic significances of ovine fasciolosis in many parts of Ethiopia [12]. However, no report so far has been published on the level of fasciolosis in the present study areas, where sheep are important assets to the local farmers. Therefore, the objectives of the study were to determine the prevalence of ovine fasicolosis in Dembecha district and to assess risk factors with the disease in sheep in the study area.

MATERIALS AND METHODS

The Study Area: The study was conducted in Dembecha district, northwestern Ethiopia, from November, 2013 to March, 2014. Dembecha is a town in northwestern Ethiopia 350 km north of Addis Ababa. Located in the Mirab Gojjam Zone of the AmharaRegion, this town has a latitude and longitude of 10°33'N 37°28'60"E. The altitude of the area ranges from 2,090 m.a.s.l. with an average temperature of 21°C [13]. Small holder mixed farming dominates (80%) and livestock is an integral part of farming system [14]. The total livestock population of the district is about 262,369. Out of the total livestock population, 120,690 cattle, 43,291 sheep and goats, 10,232 equine and 88,418 poultry were recorded [15].

Study Animals: The study animals were indigenous breeds of sheep in Dembecha district. The animals in the study period were kept under extensive management system, of different age groups and body condition of both sexes.

Study Methodology: The study design was based on cross-sectional study conducted from November, 2013 to March, 2014. A cross sectional study was conducted by involving 384 sheep during the study period to determine the prevalence of ovine fasciolosis in the study area. For this study simple random sampling was conducted. During sampling, animalsorigin, sex, age and body condition score were recorded. The body condition were grouped in to five and animals that score 0-2, 3 and 4-5 are classified as poor, medium and good body conditions, respectively according to [16]. The age of sheep were classified in to two; sheep with the age of up to 1 years as young and sheep with more than 1 years as adult [16].

Coprological Examination: A total of 384 fecal samples were examined in the laboratory to determine the prevalence of the disease. The sample was taken directly from the rectum with a disposable glove and collected by universal bottle and transported to the laboratory for fecal examination. A sedimentation technique was applied to detect *Fasciola* eggs.

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 in the area and 5% desired absolute precision according to [17].

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

where,

n = Required sample size
P exp = Expected prevalence
d = Desired absolute precision

With a 50% expected prevalence (considering no previous study was under taken), 5% absolute precision and 95% confidence level, the number sheep required to determine the prevalence was found to be 384.

Data Analysis: Data was kept and managed with excel spread sheet. Descriptive statistics and frequency distribution was done for the determination of means of parasite prevalence. Comparison of positivity of parasitism was done by chi square test. Statistical analysis was done using SPSS version (16) software. The significant level was determined at $P< 0.05$ for all statistically analyzed tests.

RESULTS

Prevalence of Ovine Fasciolosis: Out of the total of 384 fecal samples collected and examined, 70 were positive for ovine fasciolosis with overall prevalence of 18.2%.

Table 1: Prevalence of ovine fasciolosis based on origin

Site	No of examined animals	No positive animals	Prevalence (%)	χ^2	P-value
Yemehel	128	30	23.4%	3.599	P>0.05
Leget	128	21	16.4%		
Seregela	128	19	14.8%		
Total	384	70	18.2%		

Table 2: Prevalence of ovine fasciolosis based on age

Age (years)	No of examined animals	No of positive animals	Prevalence (%)	χ^2	P-value
Young	239	25	10.5%	25.628	P<0.05
Adult	145	45	31.0%		
Total	384	70	18.2%		

Table 3: Prevalence of ovine fasciolosis based on body condition score

Body condition score	No of examined animals	No of positive animals	Prevalence (%)	χ^2	P-value
Poor	109	39	35.8%	34.054	P<0.05
Medium	178	25	14.0%		
Good	97	6	6.2%		
Total	384	70	18.2%		

Table 4: Prevalence of ovine fasciolosis based on sex

Sex	No of examined animals	No of positive animals	Prevalence (%)	χ^2	P-value
Male	186	22	11.8%	9.916	P<0.05
Female	198	48	24.2%		
Total	384	70	18.2%		

The prevalence of fasciolosis in different sites of the study area was shown in Table 1. The highest prevalence was shown in Yemehel and the lowest was in Seregela, with magnitude of 23.4% and 14.8%, respectively. However, there was no statistical significant difference (P>0.05).

The study was conducted to determine the influence of age on the prevalence of ovine fasciolosis. The results revealed higher prevalence rate (31.0%) in adults, lower prevalence rate in animals of young aged (10.5%) and there was statistically significant difference on the prevalence of ovine fasciolosis based on age (P<0.05) (Table 2).

Animals of poor body condition scored the highest prevalence among the three categories of body condition with 35.8% followed by medium, 14.8% and good, 6.2% as shown in Table 3. The difference between the prevalence of ovine fasciolosis among different body condition score was statistically significant (P<0.05).

Among 384 animals, the highest prevalence (24.2%) was observed in female animals while the lowest one (11.8%) was observed in male animals. The difference between ovine fasciolosis among different sex was statistically significant (P<0.05) (Table 4).

DISCUSSION

The present study was designed to determine prevalence and assess risk factors associated with ovine fasciolosis. It revealed that an overall prevalence of fasciolosis based on coprological investigation of ovine fasciolosis was 18.2%. The prevalence of the disease in the study area may be attributed to the favorable ecological factors for the snail intermediate host and the parasite. The area is water lodged swampy and marshy area which is suitable for the intermediate host (snail) to continue the lifecycle [9]. Indeed, Michael [17] reported that expansion of small irrigation system was one of the causes for increasing prevalence of ovine fasciolosis.

Prevalence of fasciolosis was in agreement with the previous studies of Ahmed *et al.* [11] 13.2% in the middle Awash river basin, Musa [18] in Bahir Dar (15.8%), Daniel [19] in Dire Dawa (14.8%), Wassie [20] in Nekemte (12.42%) and relatively lower than previous finding by Solomon [21] in Mecha (38%), Dinka [22] in Assela (32.9%) and Adem [8] in Zeway (30.4%). The finding was not in agreement with previous studies observed at different regions by Michael [17] who reported the prevalence as 51% in DebreZeit, Ahmed [11] in Kombolcha (51.%), Yadeta [12] in Western Shoa (70.4%), Mezgebu [23] in Addis Ababa (63.8%), Beyene[24] in East Gojjam (53.2%), Fikadu [25] in Bahir Dar (60.2%) and Yilma [26] in Holeta (49%). The reason might be due to the differences in temperature, moisture, humidity and soil that might favor multiplication of intermediate host, snails. Urquhart *et al.* [9] also suggested that the difference in prevalence and severity of the disease syndrome were evident in various geographical regions depending on the

local climatic conditions, availability of permanent water and system of management.

In general the low prevalence rate than the previous work might be due to difference in sampling period, increasing awareness of peoples for the disease, decrease of swampy areas due to environmental changes and it might also be due to the improvement of veterinary services.

The present study indicated that there was highly significant difference between age groups, which appeared to be in line with reports of [11]. This study revealed that prevalence of fasciolosis was higher in sheep with increase of age. This could be due to the fact that young animals are not allowed to go far with adult animals for grazing/feeding reducing the chance of exposure to infective metacercaria. Moreover Ahmed *et al*. [11] suggested that the higher risk of exposure of adult might be due to physiological differences including stress, pregnancy and nutritional imbalances. However, the present study did not agree with Michael [20] who reported that higher prevalence of ovine fasciolosis was higher in younger than adult sheep.

The results of this study indicated that infection rates in poor body condition animals were significantly higher ($P < 0.05$) than that of good body condition animals. This revealed the importance of fasciolosis in causing weight loss and as a characteristic sign of the disease. Reports of Ahmed *et al.* [11] and Bitew*et al*. [27] conducted on ovine fasciolosis as well were in line with the current finding. Sheep of poor body condition were vulnerable to parasitic diseases [28]. The significant variation in the prevalence of fasciolosis is in relation to body condition could be further justified by the fact that as the body condition improves, infection with fasciolosis decreases because fasciola worms are known to suck blood and tissue fluid and even damage the parenchyma of the liver due to the migrating immature worms [29]. Moreover, cholangitis and liver cirrhosis induced in chronic fasciolosis could reduce bile flow to the duodenum and hence reduced lipid emulsification, digestion and absorption of fatty acid and lipid soluble vitamins [30].

CONCLUSIONS AND RECOMMENDATIONS

The result of the present study indicated that fasciolosis is a highly prevalent sheep disease in the study area. Fasciolosis is more prevalent in poor conditioned animals than in medium and good body conditioned animals. The relatively high prevalence reported in female adult sheep in this study has clearly indicated lack of strategic control measures against the disease. Based on the aforementioned conclusion the following recommendations are forwarded:

- Training need to be organized to farmers with economical significance and control methods of this disease in the study area.
- Strategic antihelmintic treatment with appropriate flukicide drug should be practiced twice a year; before and after rainy seasons to eliminate fluke burden of the host animals and minimize pasture contamination by fecal egg shedding thus interrupting the life cycle.
- Tograzing on wet pasture favorable to the snails or on the margin of pools or slow running streams should be prevented either by keeping the animals off these area or by fencing of dangerous areas.

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