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Determining the Coprological Prevalence and Associated Risk Factors of Ovine Fasciolosis in Jucavm, Jimma, South West of Ethiopia

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Abstract: A cross-sectional study was carried out from April, 2018 to July, 2018 with the aim determining the prevalence of ovine fasciolosis and associated riskfactors in jucavm, Jimma. Fecal sample were collected from a total of 384 sheep of all age, body condition and sex. Sedimentation technique was used for the recovery of *Fasciola* egg from fresh feces. Based on the coprological investigation the overall prevalence of ovine fasciolosis was 175 (45.57%). There was no statically significant difference (P>0.05) in infection rates between male and female animal. Infection rate in age group were significantly different (P<0.05). Age and body condition activity were known to be among important risk factors associated with Fasciolosis. High prevalence was recorded in poor body conditioned sheep 113 (49.8%). Statistically significant differences (P < 0.05) were observed in prevalence among the body condition and age of animals using coproscopy. In general, the study indicates that ovine fasciolosis is widely distributed disease with high prevalence rate in the study area and strategic use of anthelmintic should be applied to reduce pasture contamination with fluke's eggs.

Key words: Coproscopy · Jucavm · Fasciolosis · Prevalence · Sheep

INTRODUCTION

Ethiopia is one of developing countries in Africa, which is predominantly an agricultural country with cover 85% of its populations engaged in agricultural activity. According to recent estimates, Ethiopia has 56.71 million cattle, 29.33 million sheep, 29.11 million goats, 1.16 million camels and 56.87 million poultry [1].

Among the small ruminant 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 productivity. Despite the large size of the sheep population, the productivity per animal and the contribution of this sub-sector to the national economy is relatively low. Endo-parasitic infections, malnutrition and management problems are known to be the main factors that affect the productivity of sheeps. The various species of gastro-intestinal and pulmonary nematodes, trematodes and cestodes are known to be prevalent in Ethiopia, one of the helminthosis that causes immense direct and indirect losses especially in domestic ruminates is fasciolosis [2].

Fasciolosis is caused by *Fasciola* spp., commonly referred to as liver fluke which is a wide spread parasitic disease of sheep. *Fasciola hepatica* and *Fasciola gigantic*a are the two common species of *Fasciola hepatica* has a worldwide distribution predominating in the temperate zones and highland areas of tropics and sub tropics; whereas *F. gigantica* is mostly located in tropics. The geographical distribution of *F. hepatica* and *F. gigantica* is determined mainly by the distribution patterns of snail population that have a role as intermediate hosts. The two primary requirements for the establishment of liver fluke are snail (the intermediate host) and environment that suits the development and multiplication of liver fluke eggs [3].

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The economic effects of fasciolosis were identified and models for estimating the financial loss presented. Ovine fasciolosis losses were estimated at 48.8million Ethiopian Birr 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. Clinically, it is characterized by a progressive loss of condition and the development of anemia and hypoalbuminaemia which can result in emaciation, pallor mucous membranes, sub mandibular oedema and ascites [4].

Diagnosis is based primarily on clinical sign, seasonal occurrence and privies history of fasciolosis on the farm or the identification of snail habitats, postmortem examination, hematological tests and examination of faeces for fluke eggs. Even though, it is difficult to detect *Fasciola* in live animals, liver condemnation at slaughter or necropsy was found to be the most direct, reliable and cost efficient technique for the diagnosis of fasciolosis [5].

The control of *Fasciola* in sheep and cattle is achieved through a combination of the snail and the treatment of infected cattle. However, because of the extreme efficiency of this parasite and the way in which it takes advantage of environmental conditions to multiply enormous careful study of its ecology is necessary to predict periods of danger and initiate strategic attacks on both snail and flukes [6].

Sheep are an important asset to the local farmer particularly and the country in general. The aim of the study is to determine coprological prevalence and associated risk factors of ovine fasciolosis at jucavm, Jimma, south western Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted from April 2018 to July 2018 to determine coprological prevalence of ovine fasciolosisat jucavm, Jimmaand to identify risk factors associated with ovine fasciolosis in the study area, south western Ethiopia. Jimma town is located in Oromia region, south west of Ethiopia, at a distance of about 352 km from Addis Ababa. Geographically, Jimma is located at 7°13' and 8°56' N latitude and 35°52' and 37°37E longitude. The climatic condition of the area is 'midland with altitude ranging between 1720 to 2110 m above sea level and receives annual rainfall which ranges between 1200 to 2000 mm. There are two rain seasons, short rainy season (November to April) and long rainy season (July to October). The annual mean temperature ranges from about 12.1°C to 28°C [8].

Study Population: A total of 384 sheep were randomly selected and subjected to qualitative coprological examination. The selected animal was from one breed of different age and sex groups. The animals were managed under a semi-intensive management system and depend mostly on grazing with little supplementations and health care. Out of 384 Sheep, 195 were females and 189 were males. The study animals were classified as young, adult and old age in which the sample was taking at six months age and above.

Study Design: A cross-sectional study was conducted to determine the prevalence of the disease in the study area.

Sampling Methods and Sample Size Determination: The animals were selected by using simple random sampling method based on species, breed, sex and age. To determine the sample size, an expected prevalence of 50 % was taken into consideration. The desired sample size for the study was calculated using the formula given by Thrusfield [9] with 95% confidence interval and 5% absolute precision.

$$n = \frac{1.963 P_{\exp}(1 - P_{\exp})}{d^2}$$

where, Pexp = expected prevalence;
d= absoluteprecision;
n =sample size. The estimated sample size was384 animals

Sample Collection: Fecal samples were collected directly from the rectum in to laboratory-sampling bottles and immediately transported by cool box to the parasitology laboratory of the jimmaUniversity for Coprological Examinations. Samples that were not processed with in 24 hours from collection were stored in a refrigerator at 4°C. During every sampling, information on body condition, sex and age of animal were recorded.

Coprological Examination: Coprological examination was performed to detect *Fasciola* eggs in the faces by using standard sedimentation technique. It was used to assess the presence of fluke infections through repeated dilution of the faecal suspension and sedimentation of the eggs [|10].

Data Analysis: All raw data that were recorded from this study were interred into Microsoft excel data base system and referenced with geographical location of the study area. Using SPSS computer programs data were summarized and analyzed. Chi-square (χ^2) test was used

to determine the variation of infection prevalence between sex, body condition and age. A 5% significant level was used to determine whether there is significant difference between the parameter measures between the groups.

RESULTS

Prevalence of Ovine Fasciolosis: Over all prevalence from a total of 384 faecal samples examined from sheep of local breeds during the study periods, 175 samples were positive for fluke eggs with an overall prevalence rate of 45.57%. Prevalence of fasciolosis varied among age groups. Highest prevalence was in Adult (53.5%) and in young (31.9%). Meanwhile, low prevalence was observed in young sheep. Significant difference ($P < 0.05$) was observed among age groups in the study animals (Table 1).

Prevalence by sex groups; over all prevalence of fasciolosis in male and female sheep was 42.85% and 48.2% respectively. Although the prevalence was relatively higher in female than male, the difference was not statistically significant ($P>0.05$) (Table).

Prevalence of ovine fasciolosis on poor body condition animals were 49.8%. However, animals with medium and good body condition showed prevalence of 47.96 and 25.42% respectively. Significant difference ($P<0.05$) in prevalence was observed among body condition of the study animals (Table 3).

DISCUSSION

The result of the present study has revealed prevalence of 45.57% (175/384) in the study area which is comparable to other workers in different region of country such as [11] with prevalence of 49.0% in dawa-cheffa, kemissie, Garoma and Wakuma [12] with prevalence of 51.60% in Shambu, Yilma and Malone [13] with a prevalence of 49% in Holeta, Asrede and Shifaw [14] and Asrede and Shifaw [15] with prevalence of 50.8% in Debre Birhan and Michael [16] with prevalence of 51% in Debrezeit (mid altitude).

Prevalence of Fasciolosis was not in agreement with the previous report by Ahmed *et al.* [4] 13.2% in the middle Awash river basin. The reason might be due to the differences in temperature, moisture, humidity and soil that might favor multiplication of intermediate host, snails. The difference in prevalence and severity of the disease syndrome are evident in various geographical regions depending on the local climatic conditions, availability of permanent water and system of management [17].

The present study indicated that ovine fasciolosis become high following the increase of age in sheep. In other word, as the age of the sheep increases the chance of becoming infected with fasciolosis also increases (Table 1). So that significant variation in prevalence of ovine fasciolosis of different age group were observed ($P<0.05$). This is certainly because of that adult animal have repeatedly exposed to flukes infection than young and young animals are not allowed to go far with adult animals for grazing/feeding reducing the chance of exposure to infective metacercaria as compared to adults, similar results has been reported by Ahmed *et al.* [4], Asrede and Shifaw [14] and Graber [18].

The prevalence of the disease in female and male animals was recorded as 48.2% and 42.85% respectively. There was no statically significant difference ($P> 0.05$) in prevalence between females and male. This shows that sex seems have no effect on the prevalence and both

Table 1: Prevalence of ovine fasciolosis based on age group

Age	Noof animals examined	Noof positive animals	Prevalence (%)	χ^2	P-value
Young	141	45	31.90	16.757	0.000
Adult	243	130	53.50		
Total	384	175	45.57		

Table 2: Prevalence of ovine fasciolosis based on sex group

Sex	No.of animals examined	No.of positive animals	Prevalence (%)	χ^2	P-value
Male	189	81	42.85	1.107	0.293
Female	195	94	48.2		
Total	384	175	45.57		

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

Body condition	No of animals examined	No.ofpositive animals	Prevalence (%)	χ^2	P-value
Poor	227	113	49.8	11.502	0.003
Medium	98	47	47.96		
Good	59	15	25.42		
Total	384	175	45.57		

sex are equally susceptible and expose to the disease. And this might also be due to grazing of both groups in similar fasciola contaminated pasture land. Similar result has been reported by Asrede and Shifaw [14], Argaw [19] and Devendra and Marca [20].

Study was also carried out on prevalence of fasciolosis on the basis of body condition. The results of this study indicated that infection rates in poor body condition animals were significantly higher ($P < 0.05$) than that of medium and good body condition animals. This signifies that the importance of fasciolosis in causing weight loss and is a characteristic sign of the disease. Sheep of poor body condition are vulnerable to parasitic diseases. Similar result has been reported by Bitew, Ibrahim and Abdela [11] and Asrede and Shifaw [14].

CONCLUSION

The result of the present study indicated that Fasciolosis is a highly prevalent sheep disease in the study area. 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 as well as poor veterinary services. The result of present study and that of other previous study indicates that fasciolosis still remains one of the major health problems of animals injucavm. The prevalence was significantly influenced by species, age and body condition score of the small ruminants.

Based on the local condition prevailing in the study area the following points are recommended:

- Supplementation of important nutrient feed in dry season is important to avoid stress conditions that affect the host resistance and susceptibility to parasitic diseases.
- Improving of basic animal management system i.e. housing, watering as well as grazing management must be practiced.
- Detailed studies should be conducted on the epidemiology of the disease in order to expand and implement disease investigation and control strategy.
- To control fasciolosis strategic anthelmintic treatment of the ruminants and control of reproductive potential of intermediate host (snail) by using locally available mollicides and anthelmintics should be under taken.

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