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Prevalence of Ovine Fasciolosis in and Around JUCAVM Open Air Veterinary Clinic, Jimma, Southwest Ethiopia

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Abstract: A cross-sectional study was carried out from April 2018 to May 2018 to determine prevalence and risk factors associated with fasciolosis in and around JUCAVM. Fecal samples were collected from a total of 384 sheep of all age and sex. Sedimentation technique was used for the recovery of fasciola egg from fresh feces. From the samples examined, 197 were positive with an overall infection rate of 51.3%. The highest infection rate was found in IfaBula (60.8%) and the lowest (44.54%) in Bosa AddisKetema, through statistically non significant difference (P>0.05). There was no statistically significant difference (P>0.05) in infection rates between male and female animal. Infection rate in age group was with no significant difference (P>0.05), but there was a statistically significant difference (P<0.05) in infection rates between body conditions of animals. In general, the study indicates that ovine fasciolosis is widely distributed disease with high prevalence rate in the study area and strategic use of anthelminthic should be there to reduce pasture contamination with fluke's eggs.

Key words: Fasciolosis · Jimma · Prevalence · Sheep

INTRODUCTION

In Ethiopia, agriculture is encountered as back bone and it is also the major resource of the employment and income. About 85% of the population live in the rural areas and are primarily engaged in agricultural activities. The livelihood of more than sixteen million people of the country is dependent on agriculture [1].

Ethiopia has an extremely diverse topography with a wide range of climatic features and a multitude of agro-ecological zone which make the country suitable for different agricultural production system. This intern has contributed to the existence of the large diversity of farm animals, genetic resource in the country [2].

The diverse ecology makes Ethiopia the home for large population of different domestic and wild animals with considerable contribution to the national economy. The livelihood of both rural and urban, or sedentary postural communities in the country is to a large extent associated with the previous output down from this sector [3]. Sheep and goat provide as much as 30% of meat and milk consumed in sub-Saharan Africa and found on small holding throughout the continents. Sales of sheep and goat and their products are vital to source of cash, especially for small holders who do not have access to credit or farm income. Their small size, high reproductive capacity and rapid growth rate make small ruminants more flexible, short-term from research and development agencies than have cattle [4].

Benefit from sheep and goat production in Ethiopia remains marginal due to impact of prevalent disease, malnutrition and management constraints, parasitism including fasciolosis represents the major barrier determining the development of the sub sector. Fasciolosis is a disease mainly of domestic ruminants and occasionally other domestic animal and man caused by liver flukes, parasites, *fasciola hepatica* and *fasciola gigantica*. It is particularly important in cattle and sheep [3]. Loss due to fasciolosis is associated with mortality, reduced growth rate, reduction in weight gain and unthriftness, reduction in working power, condemnation of large number of infected liver, increased susceptibility to secondary infection and expense due to control measure [5].

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An estimate of economic loss due to ovine fasciolosis in the Ethiopia high land was made based on available data on mortality, weight loss, reduced productivity efficiency and liver condemnation at slaughter. The economic effects of fasciolosis were identified and models for estimating the financial loss presented ovine fasciolosis losses were estimated at 48.4 million in 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). The world-wide losses in animal productivity due to fasciolosis were conservatively estimated at over US $3.2 billion per annual. In addition, fasciolosis is now recognized as an emerging human disease; the world health organization (WHO) has estimated that 2.4 million people are infected with fasciola and a further 180 million are at risk infection.

The risk factor of fasciolosis is determined by the number of infected laminated snail in the grazing area. The disease has a predictable seasonal pattern in regions were snails are active for only part of the year. Some laminated snails are of more aquatic habits than others but all are restricted to damp or wet environment stricted to damp or wet environments. In general, they prefer non acidic low lying swampy area with slowly moving water. The influence of watering particles on the transmission of fasciola among sheep in the Ethiopian highlands snails burrow into the soil to survive the dry period and release circadian when free water is presented. The later expands and contract depending on water availability. Construction works, such as road building may alter drainage patterns and disease risk improvement of peaty pasture by time application may increase risk by reducing soil acidity and allowing snail colonization [6].

The present study was, therefore, undertaken with the aim of generating valuable on ovine fasciolosis coming to JUCAVM and its surroundings.

Therefore, the objectives of this study were:

- To determine the prevalence of the ovine fasciolosis in and around JUCAVM open air veterinary clinic.
- To find out associated risk factors of the ovine fasciolosis in the study area.

MATERIALS AND METHODS

Study Area: The study was conducted from April 2018 to May 2018 to determine coprological prevalence and to identify risk factors associated with ovine fasciolosis in and around JUCAVM open air veterinary clinic, Southwest Ethiopia. Jimma town is located in Oromia Regional State, 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°37' E longitude. The climatic condition of the area is midland with altitude ranging between 1720 m to 2110 m above sea level and receives annual rainfall which ranges between 1200 mm 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 [7].

Study Population: A total of 384 sheep were randomly selected and subjected to qualitative coprological examination. The study animals were indigenous sheep kept under traditional extensive management system in JUCAVM and its surroundings. In the population there were animals of different age groups and body condition of both sex groups.

Sample Size Determination: To determinate sample size, a fasciola prevalence of 50% was taken into consideration as there was no previous study conducted in the area. The desired sample size for the study was calculated using formula given by Thrusfield [8] with 95% confidence interval and at 5% absolute precision. Therefore, a minimum sample size of 384 sheep was considered for this study.

$$N = \frac{(1.96^2) * (P\exp) * (1 - P\exp)}{d^2}$$

where,
Pexp = Expected prevalence
D = Absolute precision (5%)
N = Sample size.

Sample Collection: Fecal samples were collected directly from the rectum of the study animals, preserved, transported and taken to the parasitology laboratory of the Jimma university for coprological examinations. Samples that were not processed within 24 hours after collection were stored in a refrigerator at 4°C. During every sampling, information on breed, sex and age of animal were recorded.

Study Design: Cross sectional study was conducted to determine the prevalence of ovine fasciolosis in selected study area.

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 fecal suspension and sedimentation of the eggs [4].

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 and age. A 5% significant level was used to determine whether there is significant difference between the parameter measures between the groups.

RESULTS

Carpological Examination: Over all prevalence from a total of 384 examined sheep fecal sample of the four kebeles in and around JUCAVM, 197 samples were found to be positive for fasciola eggs with an overall prevalence of 51.3%. The prevalence of fasciolosis recorded in the four peasant associations(PAs)were 60.8%, 53.5%, 49.1% and 44.5% respectively for Ifa Bula, Sexo Semero, Sadecha and Bosa Addis Ketema. There were no statistically significant differences between the prevalence of fasciola eggs in these different study sites (P>0.05).

Prevalence by Age Groups of Animals: The infection rate between young and adult animals was compared. It was observed that the prevalence of fasciolosis was significantly higher in adult (65.35%) than young (47.05) animals.

Prevalence by Sex Groups: Over all prevalence fasciolosis in male and female sheep was 50.26% in male and 52.3% in female. Although the prevalence was relatively higher in female sheep than in male sheep, the difference was not statistically significant (P>0.05).

Prevalence of fasciolosis on poor body condition animals was 98.3%. However, animals with medium and good body condition showed prevalence of 49.05% and 32.2% respectively. Significant difference (P < 0.05) in prevalence was observed among body condition of the study animals (Table 4).

Table 1: Prevalence of ovine fasciolosis based on site

Site/kebele	No. of examined animals	No. of positive animals	Prevalence (%)	χ^2	P-value
Bosa AddisKetema	119	53	44.54	6.022	0.111
SexoSemero	58	31	53.5		
IfaBula	97	59	60.8		
Sadecha	110	54	49.1		
Total	384	197	51.3		

Table 2: Prevalence of ovine fasciolosis based on age

Age	No. of examined animals	No. of positive animals	Prevalence (%)	χ^2	P-value
Young	102	48	47.05	1.001	0.317
Adult	228	149	65.35		
Total	384	197	51.3		

Table 3: Prevalence of ovine fasciolosis based on sex

Sex	No. of examined animals	No. of positive animals	Prevalence (%)	χ^2	P-value
Male	189	95	50.26	0.160	0.689
Female	195	102	52.3		
Total	384	197	51.3		

Table 4: Prevalence of Ovine Fasciolosis based on body condition

Body conditions	No. of examined animals	No. of positive animals	Prevalence (%)	χ^2	P-value
Poor	188	116	98.3	21.468	<0.001
Medium	106	52	49.05		
Good	90	29	32.2		
Total	384	197	51.3		

Table 5: Prevalence of ovine fasciolosis based on deworming history.

Deworming history	No. of examined animals	No. of positive animals	Prevalence (%)	χ^2	P-value
No deworming	195	108	55.38	2.812	0.245
Occasionally deworming	116	56	48.3		
Regularly deworming	73	33	45.2		
Total	384	197	51.3		

An attempt was also made to analyze the prevalence with respect to deworming history of the animals. The prevalence of the disease in animals that were not dewormed (55.38%) was highest, followed by dewormed occasionally (48.3%) and dewormed regularly (45.2%). The result of statistical analysis revealed no significant difference (P>0.05) in each group (Table 5).

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 51.3%. The present study was in close agreement with the report of Mitchel [9] with prevalence of 51% of Debrezeit (mid altitude)with prevalence of 50.8% in Chole woreda and with a prevalence of 49% in Holeta. The result of the present study was higher than the reports of Ahmed [2] with 13.2% in the middle Awash river basin. The result of the present coprological examination was very low from the finding of Ngategize [10] and with the overall prevalence of 54.2% and 56.2% respectively. The difference in the prevalence might be related to the variation in the agro-climate condition management system in the different study areas, including altitude, rainfall, temperature, humidity and management system of the sheep.

This prevalence in the study area may be attributed to the presence of conductive ecological factors for the snail intermediate host and the parasite (fasciola) in the study area, feature of the land escape being plain with poor drainage, heavy dark brown clay soil (with slight acidic PH) which has high capacity of water retention with annual over flooding during the rainy season leaving pockets of water bodies and is mostly marshy area for long period during the dry season. Barcha River, slowly flowing rivers and swampy parts of the river border of the area and such ecological conditions are considerable for breeding and survival of the intermediate host snails and the parasite [11, 12].

In the present study area, prevalence of bovine fasciolosis was compared based on the origin of animals. The study revealed prevalence of 59(60.8%) in IfaBula, 31(53.5%) in SexoSemero, 54(49.09%) in Sadecha and 53(44.54%) in Bosa AddisKatema with non-statistical difference (P > 0.05). This non significant difference indicates that there is no difference in the prevalence of the disease. This variation is mainly attributed to the variation in climatic and ecological conditions such as altitude, rain fall, presence of marshy areas and temperature and management system of livestock [5].

The prevalence of the disease in female and male animals was recorded as 52.3% and 50.26% respectively. There was non-significant difference (P > 0.05) between the two sexes indicating that sex has no effect on the prevalence of the disease. This may be due to the fact that the animals use common grazing area. Moreover, it might also be due to the fact that fasciolosis is not a disease directly related to animal reproductive system. Similar results have been reported by Graber and Dans and Argaw [11, 12].

The study related that prevalence of ovine fasciolosis become high following the increase of age in sheep. In other word, the younger the age, the lower the prevalence and the older the age, the higher it will be (Table 2). So, significant variation in the prevalence of ovine fasciolosis of different age group was observed (P<0.05).This is certainly because of the reasons that adult animals have repeatedly exposed to flukes infection than young and similar results were reported [13].

The results of fasciolosis on the basis of body condition in this study indicated that infection rates in animals with poor body condition (98.3%) was significantly higher (P < 0.05) than that of medium (49.05%) and good body conditions (32.2%). 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 [14].

The present result indicated that significant difference exists in deworming history (P >0.05). There was 55.38% of prevalence in those which do not dewormed and 48.3% of prevalence rate in those occasionally dewormed sheep. For sheep those regularly dewormed the prevalence was 45.2%. In the study area almost more sheep are not dewormed and especially strategic treatments not implemented at appropriate timing

and with the aim of reducing worm burden from infected animals and preclude pasture contamination. Periodic anthelmintic treatment is the most commonly used means to control the diverse effects of Fasciolosis in ruminants. It is recommended that twice yearly treatment under smallholder farmer's situation is an effective and affordable regime under tropical conditions [4].

The first treatment is recommended to be given during the dry season to eliminate the adult parasite. Such a treatment enables the animals to survive the effects of the dry season, when nutritional condition are generally compressed. It also avoids contamination with fluke eggs of water holes and irrigation channels. On the other hand, late December might be a more appropriate month to administer the treatment to sheep in the study areas concerned where the rainy season sometimes extends into October, since animals treated before mid December are liable to significant re-infection. The second treatment has to be given earlier to the wet season when the immature flukes migrate through the hepatic parenchyma. Strategic anthelmintic treatment helps to reduce grazing land contamination with fluke eggs and increases productivity [4, 5]. But in the study area, sheep were not being dewormed according to the aforementioned deworming calendar.

CONCLUSION AND RECOMMENDATION

The present study indicates that ovine fasciolosis is widely distributed disease with high prevalence rate in the study area. The levels of infection in this study suggested that there is an existence of favorable climatic conditions throughout the year for the development and survival of the parasites and their intermediate hosts in the area of origin of study animals.

Based on the above conclusion, the following recommendations are forwarded:

- Integrated approach, which is combination of selective chemotherapy and selective vector control should be considered more practically and in economically feasible ways.
- Strategic use of anthelmintics should be performed to reduce pasture contamination with fluke's eggs.
- Further study on the control aspect of the disease should be done to reduce the economic impact of fasciolosis in the study area.
- Control of snail population should be selectively directed toward the main watering point (transmission site or contact points) at specific time.

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