



Study on Prevalence and Associated Risk Factors of Ovine Fasciolosis in and Around Nekemte Town, Oromia, Ethiopia

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Abstract

A cross-sectional study was carried out in east wellaga zone of Oromia region from November 2018 to April 2019 to determine the prevalence of ovine fasciolosis specifically in and around Nekemte town. A total of 384 fecal samples were randomly collected directly from the rectum of individual animals analyzed using SPSS Version 20. Parasitological investigation was performed using sedimentation technique. From a total of 384 coprologically examined sheep, 126 animals were found positive for fasciolosis with an overall prevalence of 32.8%. The prevalence rate of fasciolosis in adult sheep (37.4%) was higher than in young sheep (26.0%) and the difference was statistically significant ($P < 0.05$). Animals with a poor body condition scores have the highest prevalence among the three categories of body condition with 43.1% in poor body conditioned sheep followed by medium 30.1% and 23.8% finding was recorded in good body conditioned. The difference between the prevalence of ovine fasciolosis among different body condition score was statistically significant ($P < 0.05$). There was no statistically significant difference ($P > 0.05$) between male and female sheep, even though the highest prevalence 34.8% was observed in female animals while lowest prevalence (30.5%) was observed in male animals. A site wise prevalence of fasciolosis were 37.2%, 34.8%, 28.4% and 25.0% Jireenya, Ab-deta, Calalaqi and Burka jato respectively. The difference in prevalence of fasciolosis based on site was no statistically significant ($p > 0.05$). From this study it was concluded that ovine fasciolosis was prevalent, thus posing 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.

Received: May 29, 2021

Accepted: Jul 07, 2021

Published Online: Jul 09, 2021

Journal: Journal of Veterinary Medicine and Animal Sciences

Publisher: MedDocs Publishers LLC

Online edition: <http://meddocsonline.org/>

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Keywords: Fasciolosis; Nekemte; Ovine; Prevalence; Sheep.

Abbreviations: CSA: Central Statistical Agency; ETB: Ethiopian Birr; Km: kilometer; MaSL: Meter above Sea Level; MoARD; Ministry of Agriculture and Rural Development; Rpm: Revolution Per Minute; SPSS: Statistical Package for Social Science; USD: United State Dollar; WHO: World Health Organization.

Cite this article: Regea G, Getachew G. Study on Prevalence and Associated Risk Factors of Ovine Fasciolosis in and Around Nekemte Town, Oromia, Ethiopia. *J Vet Med Animal Sci.* 2021; 4(1): 1069.



Introduction

Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country (CSA, 2014). 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 (CSA, 2009).

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 [1]. 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 [2]. Regardless the large size of the sheep population in the country and the huge potential there in; 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 [3] Haileleul, 2002 cited in Tesfahaywet, 2012).

In the diverse agro-climatic zones of Ethiopia, small ruminants are important source of income for rural communities and are one of the nation's major sources of foreign currency from exports. The country has, however, benefited little from this enormous resource owing to a multitude of problems, disease being the most important. Productivity losses attributable to helminthes parasites are often substantial (CSA, 2009). Gastro-intestinal helminthosis is considered as one of the major parasitic problems that constrain livestock improvement programs in Ethiopia. Fasciolosis is the helminthosis that causes direct and indirect losses of domestic animal immunities [4].

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].

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 [7]. Fasciolosis is caused by digenea trematode of the genus *Fasciola* consisting of two species usually implicated in causing the disease namely *F. hepatica* and *F. gigantica*. Ruminants are the natural hosts for *Fasciola* among which sheep and cattle suffer the highest infection [7,8]. Fasciolosis is an economically important disease leading to huge financial losses due to morbidity and mortality and also due to liver condemnation there by contributing to loss in productivity of livestock industry in Ethiopia [9]. Ahmed et al. [9] 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 [10,11]; 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 fasciolosis and
- To assess the risk factors that might contribute to the

disease in the study area in the study area.

Materials and methods

The study area

The study was conducted in districts of guto gidda specifically in and around Nekemte town from November 2018 to April 2019 G.C. The districts are found in East Wollega Zone, Oromia Regional state of Ethiopia. It is located at 331 km West of Addis Ababa at latitude and longitude of 90° S'N and 360° 33'E, respectively with an elevation of 2,088 meters above sea level, the minimum and maximum annual rain fall and daily temperature ranges between 1450 to 2150 mm and 15°C to 27°C, respectively [12]. The livestock population of the district is comprises of 132044 of cattle; 21482 sheep; 17319 goats; 49094 equines and 10293 heads of donkeys.

Study population

The study animals were sheep kept under traditional extensive management system of indigenous breed with different age, sex, body conditions found in and around nekemte town.

Sampling

Simple random sampling was followed and the study animals were selected. On the basis of proportion of ovine population in a selected Kebele's numbers of animals used for sample from each from each Kebele were determined. Animals within the selected peasant association were selected using simple random sampling. The sample size for the study animal was calculated on the basis of 50% prevalence of ovine fasciolosis in study area. It was computed with the expected precision at 5 and 95% confidence interval and a total of 384 animals were sampled according to Thriestfield (2005).

Study design

A cross-sectional study design was used and the overall prevalence and putative risk factors that might contribute to the disease were estimated as to their association to ovine fasciolosis.

Study methodology

Cross-sectional study was conducted from November 2018 to April 2019 in the study area. A total of 384 fecal samples were collected from sheep to determine the prevalence of ovine fasciolosis. During sampling, animals sex, age, origin and body condition score was recorded. The body condition were grouped in to three and animals that score 0, 2 and 3 classified as poor, medium and good respectively according to MoARD [13]. 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 [13].

Cooprological 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 see the *fasciola* eggs.

Data management and analysis

Data was recorded and managed with excel spread sheet. Descriptive statistics and frequency distribution was made for the determination of means of parasite prevalence. Comparison of positivity of parasitism was made by chi square test. A statistical analysis was using SPSS version (20) software. The

significant level was determined at $P < 0.05$ for all statistically analyzed tests.

Results

Prevalence of ovine fasciolosis

In the present study of 384 fecal sample examined, 126 (32.8%) were found to be positive for fasciola eggs. In current study, 210 (54.7%) were female, 174 (45.3%) were male whereas, 154 (40.1%) were young and 230 (59.9%) were adult with different body condition (Table 1).

Table 1: Demographic history of the sampled animal.

Variable		Frequency	Percent
Sex	Male	174	45.3%
	Female	210	54.7%
Age	Young	154	40.1%
	Adult	230	59.9%
Body condition	Poor	130	33.9%
	Medium	153	39.8%
	Good	101	26.3%
Kebele	Abdeta	141	36.7%
	Jireenya	131	29.4%
	Calalaqi	56	14.6%
	Burka jato	74	19.3%
Result	Negative	258	67.2%
	Positive	126	32.8%

Prevalence of ovine fasciolosis based on origin: Out of the total of 384 fecal samples collected and examined 126 were positive for ovine fasciolosis with overall prevalence of 32.8%. The prevalence of ovine fasciolosis is different in different site of the study areas and difference on the prevalence of ovine fasciolosis based on Kebele was statistical insignificany ($P > 0.05$) as summarized in (Table 2).

Table 2: Prevalence of ovine fasciolosis based on origin.

Kebele	No. examined animal	No. positive	prevalence	p-value
abdeta	141 (36.7%)	49	34.8% 37.2% 25.0% 28.4%	.331
jirenya	113 (29.4%)	42		
Calalaqi	56 (14.6%)	14		
Burka jato	74 (19.3%)	21		
Total	384 (100%)	126	32.8%	

Prevalence of ovine fasciolosis based on age: The study conducted to see the influence of age on the prevalence of ovine fasciolosis revealed that there was higher prevalence rate (37.4%) in adults and lower prevalence rate in young aged animals (26%) and there was statistically significant difference on the prevalence of ovine fasciolosis based on age ($P < 0.05$) (Table 3).

Table 3: Prevalence of ovine fasciolosis based on age.

Age	No. examined animal	No. positive	prevalence	p-value
Young	154 (40.1%)	40	26.0%	.020
Adult	230(59.9%)	86	37.4%	
Total	384 (100%)	126	32.8	

Prevalence of ovine fasciolosis based on body condition: Animals with a poor body condition scores have the highest prevalence among the three categories of body condition with 43.1% followed by medium, 30.1% and 23.8% finding was recorded in good body conditioned ovine's. The difference between the prevalence of ovine fasciolosis among different body condition score was statistically significant as shown in (Table 4) ($P < 0.05$).

Table 4: Prevalence of ovine fasciolosis based on body condition score.

Body condition	No. animal examined	No. positive	Prevalence (%)	p-value
Poor	130 (33.9%)	56	43.1%	.005
Medium	153 (39.8%)	46	30.1%	
Good	101 (26.3%)	24	23.8%	
Total	384 (100%)	126	32.8%	

Prevalence of ovine fasciolosis based on sex: The highest prevalence 73 (34.8%) was observed in female animals while lowest prevalence 27.53 (30.5%) was observed in male animals. The difference between ovine fasciolosis among different sex was statistically insignificant ($P > 0.05$) (Table 5).

Table 5: Prevalence of ovine fasciolosis based on sex.

Sex	No. examined animal	No. positive	prevalence	p-value
Male	174 (45.3%)	53	30.5%	0.371
Female	210 (54.7%)	73	34.8%	
Total	384 (100%)	126	32.8%	

Discussion

Ovine fasciolosis exists in almost all region of Ethiopia. However, the prevalence, epidemiology and *Fasciola* species involved vary with locality. This is mainly attributed to the variation in the climate and ecological condition such as altitude, rainfall, temperature, and livestock management system. The result of present study was indicated that ovine fasciolosis prevalence of 32.8% (126/384) in the study area. Observation generally suggest that ovine fasciolosis is an endemic condition in the study area and is an indication of the existence of favorable bionomic and ecological conditions for the survival, multiplication and spread of intermediate snail host and the parasite in that environment. The prevalence of fasciolosis recorded in the four kebele were 37.2%, 34.8%, 28.4% and 25.0% in jirenya abdeta Burka jato and Calalaqi respectively. This difference in prevalence was not statistically significant ($p > 0.05$).

This finding is comparable to previous report from North shoa (35.94 %) by Eyob et al. [14] and in Wadla Woreda (33.85%) by

Chekol B and Girma Y [15]. This may be attributed to the presence of similar favorable ecological factor for the development of snail intermediate hosts and the parasites

This study on prevalence of ovine fasciolosis was higher than previous report from the middle Awash River basin report by Ahmed et al. [9] (13.2%), Henok and Mekonnen [16] in Hirna town 14.6%. This is attributed mainly to the variation in ecological conditions such as altitude, rainfall, temperature, variation in accessibility of sheep to swampy communal grazin and live-stock management system.

The result of current study was relatively lower than previous finding by Jarso D [17] in and Around Debre Berhan (48.21%), Molalegne et al. [18] in and around Dawa-Cheffa (49%) and Hubad Hussien, et al. [19] in and Around Chole Woreda (50.8%). This variation might be attributed to the difference in the infestation level of study area, the season of the study period, feature of the land escape, sample size and the present study was conducted relatively within short period of the year when the infections rate of fasciolosis is low.

In general the low prevalence rate of the previous work might be due to difference in sampe size, increasing awareness of peoples for the disease, decrease of swampy areas, and it may also be due to the improvement of veterinary services.

The present study indicated that there was significant difference between age groups, which agrees with reports of [9,11,16]. This study revealed that prevalence of fasciolosis was increase as age increased. This could be due to the fact that young animals are not often driven with adult animals for grazing/feeding reducing the chance of exposure to infective metacercaria as compared to adults and longtime exposure in adult. The long prepatent period of the disease has effect not to be seen in young animals. Additionally adult sheep were frequently graze and covers large area of grazing land than young that allows more chance of exposure to infestation. More over Shanko [20] suggested that the higher risk of exposure of adult might be due to physiological differences, such as stress, pregnancy, lambing, inadequate nutrition, and infectious disease. While, Rubina et al. [21] reported higher prevalence in younger animals possibly indicating that fasciolosis was hyper-endemic in area and animals get infection shortly after birth.

This study was also carried out on prevalence of ovine fasciolosis based on body condition. The results of this finding indicated that infection rates in poor body condition animals were significantly higher ($P < 0.05$) than that of medium and good body conditions animals. This finding agrees with the result of Molalegne et al. [18], Desta et al. [22] and Mathewos et al. [23] in different study areas. This signifies that the importance of fasciolosis in causing weight loss and is characteristic sign of the disease. Sheep of poor body condition are vulnerable to parasitic diseases (Devendra and Marca, 1983).

The prevalence of the disease in female and male animals was recorded as 34.8% and 30.5%, respectively. There was no significant difference ($P > 0.05$) between the two sexes as that of absence of significant sex related differences reported by Asegde [24]. However, some workers found higher prevalence rate in the male than female and their justification were related to management system with longer exposure of males outdoors when females are kept indoors at the end of pregnancy and at the beginning of lactation [25].

Conclusions and recommendations

The result of the present study indicated that fasciolosis was moderately prevalent in the study area. The results of the present study revealed that body condition score and age have significant effect on the prevalence of ovine fasciolosis. 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 relatively moderate prevalence reported in this study has clearly indicated lack of full strategic control measures against the disease. However, it is increasingly evident that a proper evaluation of the epidemiology of fasciolosis is lacking.

Based on the above conclusions, the following recommendations were forwarded.

- Strategic anthelmintic 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.
- To control infection of farm animals with metacercaria, grazing 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.
- The field veterinarian should aware sheep owners on importance and burden of fasciola in sheep.
- Regular de-worming program should be implemented using broad spectrum anthelmintic.
- Further epidemiological study should be conducted in the area including environmental factors like management conditions that helps to design an appropriate control measures.

Acknowledgments

First of all, I would like praise almighty God who is the baseline for my life, education and successful accomplishment of this paper. Next, I would like to thank my advisors Dr. Motuma for his unreserved help, constructive advice and time devotion to correct this manuscript. I would also like to thank him for his genuine and energetic encouragement, positive cooperation, suggestion, insight and scientific and professional guidance from the time of title selection until correction of this manuscript and for scarifies he paid for me to provide material and moral support to do on this important title accordingly and timely.

I want to express my deepest gratitude and appreciation to Wollega University for providing me a valuable material, reagent and for their assistance during my research prwork.

Finally, my unreserved, heartfelt gratitude also goes to my father and my mother for their moral and financial support through my entire educational career.

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