Global Veterinaria 24 (2): 42-46, 2022
ISSN 1992-6197

DOI: 10.5829/idosi.gv.2022.42.46

Prevalence of Ovine Fasciolosis and its Associated Risk Factors in and Around Holeta Town, Centeral Ethiopia

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Abstract: A cross sectional study was conducted to determine prevalence and risk factors associated with fasciolosis in and around Holeta town, Centeral Ethiopia from July, 2021 to August, 2021. Faecal samples from a total of 384 ovine were subjected to coprological investigation. Based on the coprological examination, the overall prevalence of fasciolosis was 102(26.56%). Infection rate of fasciolosis 49 (32.24%) in male group was higher than the animals in female group which is 53(22.84%). Although, there was statistically significant variation among sex group (χ^2 = 4.153; P = 0.042). The prevalence rates on body conditions basis was 28(45.90 %), 10 (37.04 %) and 64(21.62%) in moderate, poor and good body condition, respectively. There was significant variation in infection rate between body conditions (χ^2 = 16.92; P<0.001). When prevalence rate among age groups is considered analysis of data indicates that 79(26.07%) and 23(28.40%) in adult and young, respectively. It was not statistically significant when get analyzed between age group (χ^2 = 0.177; P= 0.674), Infection rate of fasciolosis 31(62 %) in Wolmera Coke kebeles was higher and Sademo was the least among in and around Holeta town. The present study revealed that ovine fasciola infection was attributed to the presence of favorable environment for the abundance of intermediate host and the parasite. Integrated approach with a combination of chemotherapy and vector control should be considered more practical and awareness should be created for owners about disease transmission methods for prevention and control methods.

Key words: Fasciolosis · Holeta · Ovine · Prevalence

INTRODUCTION

Ethiopia is believed to have the largest livestock population in Africa, with an estimated population of 7.8 million of equine, 1 million of 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 role. 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 [2].

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 [3]. 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[4].

Fasciolosis is known by different local names in various parts of Ethiopia that vary according to the region and language [5]. In Amharic, it is called “Kulkult”, “Wadomma”, “and yegubet tile”. In Afan Oromo, it is known as “Dadao”, “Losha” and “RammoTiruu”. In Tigray language, it is termed as “Ifil [6].

The economic significant of fasciolosis in the highlands of Ethiopia has been reported by several workers. An estimate of the economic loss due to ovine fasciolosis in the Ethiopian high lands was made based on available data on mortality weight loss, reduced reproductive efficiency and liver condemnation at slaughter [7]. The economic effects of fasciolosis were identified and models for estimating the financial loss presented. Ovine fasciolosis losses were estimated at

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48.8 million 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 [8].

Ovine fasciolosis in Ethiopia is very frequent and causes a significant economic loss in production, decrease productivity and loss of body condition and the annual losses were estimated at 48.4 million 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 at slaughter respectively [9].

In the study area, fasciolosis is the major disease which affects sheep production and productivity in the past that large numbers of sheep were died out, but studies on the epidemiology of fasciolosis in sheep were not so far conducted in and around Holeta Town of Oromia regional state and it was the rationale that initiated this research project. Therefore, the objective of this study was

- To determine the prevalence of ovine fascollosis and
- Assessing associated risk factors of ovine fascollosis in and around Holeta, Central Ethiopia

MATERIALS AND METHODS

Study Area Description: The study was conducted from september 2021 to Augest2021 in and around Holota towns. Holata is located at a distance of 44km West of Addis Ababa. It is located at latitude of 9°3'N and longitude 38°30'E and altitude of 2391 meters above sea level and highland area. It has daily mean annual temperature 14.2°C with mean annual rain fall of 1067 mm [10].

Study Population: The study animals comprised of indigenous sheep of local breeds in and around Holeta purposively selected kebeles consisting of various ages, sexes, Body condition, watering and feeding with regard to the prevalence of ovine fasciolosis.

Study Design: The cross sectional study was conducted from July, 2021 to Augest, 2021 to determine the prevalence of ovine fasciolosis and associated risk factors (Sex, Age, Body condition, Feeding and kebeles) in and aroumd Holeta town, Central Ethiopia.

Sampling Technique and Sample Size Determination: Study population comprises of indigenous ovine of different body condition, sex and age category found under the extensive grazing system. Simple random sampling technique was used to collect all the necessary data from faecal samples of the study animals. The sample size for the study was calculated using the formula given by Thrusfield [11]. For calculating the required sample size, 95% Confidence Interval (CI) and 5% absolute level of precision was used. For this study, 52.63% prevalence reported by Omer [12].in Southwest Shewa zone was used to calculate the sample size using the following formula.

$$N = 1.962 \times Pexp(1-Pexp)/d2$$

where,

n = required sample size
d = desired absolute precision 0.05,
Pexp = expected prevalence (50%).Based on the above formula, the required sample size was 384.

Data Collection: Fresh faecal samples were collected directly from the rectum and put in a right sample bottle containing 10% formalin as preservative and immediately taken in National Agricultural Biotechnology Institute center, Holeta (NABIC Laboratory for examination. In the laboratory, faecal sample was screened for the presence of fasciola egg using sedimentation technique. While collecting the faecal samples, body condition, sex, age kebeles and feeding system of ovine was recorded.

Coprological Examination: Sedimentation technique was used to detect the presence or absence of fluke eggs in the fecal sample collected according to Urquhart [13]. Three grams of faeces was added to 42 ml of water in a graduated cylinder. The contents were then mixed thoroughly using a glass rod and were poured through a tea strainer to remove large debris. The solution was then further passed through a sieve (mesh aperture 210 mm) into a conical flask and water was run through the sieve to ensure no eggs remained attached to the sieve. The filtrate was then allowed to sediment for 3 minutes after which the supernatant was siphoned off taking care not to disturb the precipitated matters. The latter was stained with two drops of methylene blue and the entire sediment placed on slide covered with a cover slip and viewed under a compound microscope. Samples that were not processed within 24 hours were stored in a refrigerator at 4°C [14].

Data Management and Analysis: The raw data was inserted in to Microsoft excel spread sheet to create a data base. Then this data was further analyzed by using Statistical Packages of Social Science (SPSS) version 20

software programs. Chi-square test was used to determine the variation in infection prevalence between body condition, sex, age and kebeles. Statistical significance was set at $P < 0.05$ to determine the presence of significant differences between occurrence of fasciolosis and risk factors.

RESULTS

From a total of 384 fecal samples examined from ovine during the study period, 102 (26.56 %) samples were found positive for fasciolosis. Infection rate of fasciolosis 49(32.24%) in male group was higher than the animals in female group which is 53(22.84%). Although, there was statistically significant variation among sex group ($x^2 = 4.153$; $P<0.05$). As to the prevalence rates on body conditions basis, infection rates of 28(45.90 %), 10(37.04 %) and 64(21.62%) in moderate, poor and good body condition respectively were observed. Statistical analysis of this result shows there was significant variation in infection rate between body conditions ($x^2 = 16.92$; $P<0.05$). When prevalence rate among age groups is considered analysis of data indicates that 79 (26.07%) and 23 (28.40%) in Adult and young respectively. It was not statistically significant when get analyzed statistically between age group ($x^2 = 0.177$; $P > 0.05$). Prevalence rate of fascolosis among feeding was extensive feeding 99(32.9) and Intensive 3(13.1), It was statistically significant ($x^2= 0.189$, $p < 0.05$ Infection rate of fasciolosis 31(62 %) in Wolmera Coke kebeles was higher and Sademo 0 (0.00%) was the least among in and around HoletaKebeles (Tables 1, 2, 3, 4 & 5) respectively.

Table 1: Coprological prevalence of ovine fasciolosis based on sex

Variable	Categories	No of examined	Number of positive	Prevalence (%)	Chi-square (χ^2)	P value
Sex	Male	152	49	32.24	4.153	0.042
	Female	232	53	22.84		
Total		384	102	26.56		

Table 2: Coprological prevalence of ovine fasciolosis based on Body Condition

Variable	Categories	No of examined	Number of positive	Prevalence (%)	Chi-square (χ^2)	P value
BCS	Poor	27	10	37.04	16.92	<0.001
	Moderate	61	28	45.90		
	Good	294	64	21.62		
Total		384	102	26.56		

Table 3: Coprological prevalence of ovine fasciolosis based on Age

Variable	Categories	No of examined	No of positive	Prevalence (%)	Chi-square(χ^2)	P value
Age	Young	81	23	28.40	0.177	0.674
	Adult	303	79	26.07		
Total		384	102	26.56		

Table 4: Coprological prevalence of ovine fasciolosis based on Feed

Variable	Categories	No of examined	No of positive	Prevalence (%)	Chi-square (χ^2)	P value
Feeding	Extensive	361	99	27.4	0.189	0.003
	Intensive	23	3	13.1		
Total		384	102	26.56		

Table 5: Coprological prevalence of ovine fasciolosis based on Kebeles

Variable	Categories	No of examined	No of positive	Prevalence (%)	Chi-square (x^2)	P value
Kebeles	Sademo	3	0	0.00	77.83	<0.001
	Goro kerensa	19	1	5.26		
	Wajitu Harbu	46	4	8.70		
	Nano Suba	50	5	10.0		
	Geresu Sida	37	4	10.81		
	Bekeka Qore Edo	22	3	13.64		
	Tulu Wato Dalacha	21	4	19.05		
	Dewaf Lafto	10	2	20.00		
	Goro Kerensa	17	4	23.53		
	Bukusami G/Robi	17	5	29.41		
	Geba Kamisa	40	13	32.50		
	Haro Boki	16	6	37.50		
	Falle Tulu Rada	5	2	40.0		
	Burka Harbu	2	1	50		
	Talaco	29	17	58.62		
	Wolmera Choke	50	31	62.0		
Total		384	102	26.56		

DISCUSSION

Fascioliosis is an important parasitic disease of domestic ruminants caused by two liver fluke species: Fasciola hepatica and Fasciolagigantica. Fasciola hepatica has a cosmopolitan distribution, mainly in temperate zones, while Fasciolagiganticais found tropical regions of Africa and Asia. Focusing on the potential risk factors associated with the spread of fascioliasis among the livestock animals may help on understanding the transmission and also may be benefit for the control strategy of fascioliasis [15]. Prevalence rate of 26.56% in ovine fasciolosis was found in fecal examination in and around Holeta. This study was less than the study that was conducted in the DebreBirahan area [16]. Who reported an overall prevalence of 50.8% and which was higher than Nuraddis [17]. Who found an overall prevalence of 24.4% in Haromaya, Ethiopia.

The present study was also designed to determine prevalence and assess risk factor associated with ovine fasciolosis. It revealed that an overall prevalence of 26.56% based on coprological examinations. The prevalence of the disease in female and male animals was recorded as 22.84 % and 32.24 % respectively. There was a significant difference ($P < 0.05$) between the two sexes indicating that sex seems an effect on the prevalence of the disease. This study is disagree with the study reported by Alemayehu[18].which is The prevalence of the disease in female and male animals was recorded as 36.6% and 34.6% respectively. There was no significant difference ($P > 0.05$) between the two sexes indicating that sex seems no effect on the prevalence of the disease.

The present study indicated that, the prevalence of the disease in Adult and young animals were recorded as 26.07 % and 28.40 % respectively. There was no significant difference ($P > 0.05$) between the two sexes indicating that sex seems no effect on the prevalence of the disease, which disagrees with reports of Ahmed *et al.* [8], which revealed that prevalence of fasciolosis was higher in sheep with increase of age. Similar results that support the present finding were reported by Omer [12].

Prevalence of Fasciolosis on poor, good and medium body condition animals were 10(37.04%), 28(45.90%) and 64(21.62%) respectively. The present findings in body condition scores were in slight disagreement with the report of Molalegne [19], who reported 73.7% in poor and 38.5% in medium body condition of sheep, 19.5% in good body condition categories. This study showed a significant difference ($P < 0.05$) in prevalence among the body condition of the animals.

The prevalence of ovine fasciolosis associated with feeding was, Extensive feeding 99(32.9%) and intensive 3(13.1%). This study showed a no significant difference ($P < 0.05$) in prevalence among the feeding condition of the animals.This study agree with Hunter [20]. Observed that a well fed animal was not in trouble with worms and usually a poor diet resulted in more helminth infections. Furthermore, helminthes also led to a loss of appetite and poor utilization of food, which results in a loss of body weight, demonstrated that weekly growth rates of wool and live weight decreased with increasing fluke burdens in sheep.

CONCLUSION AND RECOMMENDETION

The present study showed that ovine fasciolosis was a widely distributed disease with high infection rate in the study sites. Accordingly, strategic application of fluckicide and provision of worm safe pasture provide better considerable success in the prevention/control of fluke infection in the study area. Observed differences in the prevalence of parasitic infections between kebeles, age, sex, feeding and body conditions were probably due to differences in management systems. A strategic control program must be launched to prevent the increase of parasites in the environment and to avoid heavy contamination of the pasture by fecal eggs due to limited accuracy of coprological examination, it will be supported by other diagnostic techniques like post mortem and immune diagnosis so as to provide a clear picture on the prevalence of ovine fluke infection in the study area. The role of different epidemiological condition and intermediate hosts involved in the prevalence of fluke infections should clearly be established in order to understand their effect in the control of fluke disease in the future. Based on the above conclusion, the following recommendations are forwarded:

- Integrated approach with a combination of chemotherapy and vector control should be considered more practically.
- Awareness should be created for owners about disease transmission methods.
- Awareness should be enhanced for prevention and control of the disease.
- Periodic deworming of the animals should be encouraged.
- Animal should be restricted from grazing in marshey areas.
- Further study on epidemiology, ecology and biology of intermediate host snail should be carried out for better control of disease.

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