

Research Article

Prevalence of Ovine Fasciolosis in Wolayta Sodo, Southren Ethiopia

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Abstract

A cross sectional study was conducted to determine prevalence and risk factors associated with fasciolosis Wolayta Sodo, Southern region from October, 2019 to January, 2020. Faecal samples from a total of 384 ovine were subjected to coprological investigation. Based on the coprological examination, the overall prevalence of fasciolosis was 150 (39.06%). High prevalence was recorded in poor body conditioned ovine 88% (42.93). However, there was no statistically significant variation among body condition group ($\chi^2 = 1.1134$; $P > 0.05$).

Prevalence rates based on sex, infection rates of 82% (41.62) and 68% (35.98) in male and female respectively were observed. Statistical analysis of this result shows no significant variation in infection rate between sex ($\chi^2 = 1.1154$; $P > 0.05$). When prevalence rate among age groups is considered analysis of data indicates that 82% (41.62) and 68% (35.98) in young and adult respectively. It has statistically significant when get analyzed statistically between age group ($\chi^2 = 54.1337$; $P < 0.05$).

The present study revealed that infection of ovine by fasciola was attributed to the presence of favorable environment for the abundance of intermediate host and the parasite.

Keywords: Fsciolosis; Ovine; Prevalence; Sodo

Abbreviations

CI: Confidence interval

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CM: Centimeter

°C: Degree centigrade

KMS: Kilo Meters

MM: Mili Meter

ML: Mili Liter

SPSS: Statistical Package for Social Science

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]. In Ethiopia, sheep are the dominant livestock providing up to 63% of cash income and 23% of food subsistence value obtained from livestock production. Endoparasitic infection and management problems are known to be the main factors that affect productivity. The various species of gastrointestinal and pulmonary nematodes, trematodes and cestodes are known to be prevalent in Ethiopia [2-4].

Fasciolosis is one of the important parasitic diseases in tropical and subtropical countries which limit productivity of ruminants [5]. The disease is caused by digeneantrematodes of the genus *Fasciola* commonly referred to as liver flukes. *Fasciola hepatica* and *Fasciola gigantica* are the two liver flukes commonly reported to cause fasciolosis in ruminants [6].

Species identification of *Fasciola* is possible both grossly and microscopically at the adult level. *F. hepatica* is a leaf shaped fluke with broader anterior and cone shaped posterior projection. It is grayish brown in color changing to gray when preserved. The cuticle is armed with sharp spines. The mature adult flukes measure about 2.5-3.5cm in length and 1cm in width. *F. gigantica* is larger than *F. hepatica* and can reach up to 7.5cm length. The shape is more of leaf like, the conical anterior end is very short and the shoulder characteristic of *F. hepatica* is barely perceptible [7].

The disease is found in more water lodged and marshy grazing filed condition anticipated to be ideal for the propagation and maintenance of high prevalence of fasciolosis. The clinical features of fasciolosis can have acute, sub-acute and chronic forms [8]. In Ethiopia, *F. gigantica* is found at altitude below 1800 meter above sea level. While *F. hepatica* is found at altitude between 1200-2560 meter above sea level [9].

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 [10].

Loss due to fasciolosis is associated with mortality, reduced growth rate, reduction in weight gain and unthriftiness, reduction in working power, condemnation in large number of infected livers, increased susceptibility to secondary infection and expense due to control measure [10].

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. Therefore, the objectives of this study were:

- To determining the prevalence of ovine fasciolosis
- To assessing associated risk factors in Wolayta Sodo, Southren Ethiopia

Materials and Methods

Study area description

The study was conducted in Wolayta Sodo, Southern Ethiopia from October, 2019 to January, 2020. The town is located 383 kms southwest with an elevation between 1650 and 2980 meters above sea level. The town is bounded with Damot Gale Woreda to the North, Humbo Woreda to the South, Damot Woide Woreda to East; and Damot Sore Woreda to the West. The annual rain fall and temperature of the area is 1000-1200mm and 25- 35°C respectively. The area is categorized under Woina Dega agro ecological climate. The dry season extends from September to February and the rain season stay from March to August, but sometimes fluctuation of weather condition.

Study population

The study populations for the study were ovine from different localities and their vicinity and categorized based on their body condition, sex and age.

Management system

The animals were watered from pond and spring water during wet season for animals.

Study design

The cross sectional study was conducted from October, 2019 to January, 2020 to determine the prevalence of ovine fasciolosis in Wolayta Sodo, Southren Ethiopia.

Study animals and sampling technique

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 the sampling strategy used to collect all the necessary data from fecal samples of the study animals.

Sample size determination

Sample size was conducted using random sampling techniques which ensure the sample is evenly distributed across the study population. 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. Since there was no pervious study conducted on small ruminant fasciolosis in the study area, 50% expected prevalence was taken.

$$N = 1.962 \times P_{exp} / (1 - P_{exp}) / d^2$$

Where n=required sample size

d=desired absolute precision 0.05,

P_{exp}=expected prevalence (50%).

Based on the above formula, the required sample size was 384.

Method of 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 Sodo regional 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 and age of ovine was recorded.

Corpological examination

Sedimentation technique was used to detect the presence or absence of fluke eggs in the fecal sample collected according to [12]. Two 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. Eggs of *Fasciola* species were identified by their characteristic morphology and colour. To differentiate between eggs of *Paramphistomum* species and *Fasciola* species, a drop of methylene blue solution was added to the sediment where eggs of *Fasciola* species show yellowish colour while eggs of *Paramphistomum* species stain by methylene blue [13]. Samples that were not processed within 24 hours were stored in a refrigerator at 4°C.

Data management and analysis

The raw data that 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. Finally, the data was summarized with tables in accordance to the body condition, sex and age groups. Chi-square test was used to determine the variation in infection prevalence between body condition, sex and age.

Statistical significance was set at P < 0.05 to determine the presence of significant differences between occurrence of fasciolosis and risk factors. The total prevalence was calculated by dividing the number of *Fasciola* positive animals by the total number of animals tested or sampled.

Results

From a total of 384 fecal samples examined from ovine during the study period, 150 (39.06%) samples were found positive for fasciolosis. Infection rate of fasciolosis in poor body condition group was higher than the animals with good body conditions group. However, there was no statistically significant variation among body condition group ($\chi^2 = 1.1134$; P>0.05). As to the prevalence rates on sex basis, infection rates of 36% and 42% in female and male respectively were observed. Statistical analysis of this result shows no significant variation in infection rate between sex ($\chi^2 = 1.1154$; P>0.05). When prevalence rate among age groups is considered analysis of data indicates that 42% and 37% in Adult and young respectively. It has statistically significant when get analyzed statistically between age group ($\chi^2 = 54.1337$; P < 0.05) (Tables 1, 2 & 3).

Variables	Category	Number of examined	Number of Positive	Prevalence (%)	Chi-square	P-value
BCS	Poor	205	88	42.93	1.1134	0.381
	Moderate	140	51	36.43		
	Good	39	11	33.33		
Total		384	150	112.69		

Table 1: Coprological prevalence of ovine fasciolosis based on body condition.

Variables	Category	Number of examined	Number of Positive	Prevalence (%)	Chi-square	P-value
Sex	Male	197	82	41.62	1.1134	0.291
	Female	187	68	35.98		
Total		384	150	77.60		

Table 2: Coprological prevalence of ovine fasciolosis based on sex.

Variables	Category	Number of examined	Number of Positive	Prevalence (%)	Chi-square	P-value
Age	Young	197	82	41.62	54.1334	0.001
	Adult	187	68	35.98		
Total		384	150	76.60		

Table 3: Coprological prevalence of ovine fasciolosis based on age.

Discussion

Fasciolosis is an important parasitic disease of domestic ruminants caused by two liver fluke species: *Fasciola hepatica* and *Fasciola gigantica*. *Fasciola hepatica* has a cosmopolitan distribution, mainly in temperate zones, while *Fasciola gigantica* is 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 [14].

Prevalence rate of 39.06% in ovine fasciolosis was found in fecal examination in Wolayta Sodo. This study, however, was not in line with the study that was conducted in the Debre Birahan area [15] who reported an overall prevalence of 50.8%, and Nuraddis et al. [16], who found an overall prevalence of 24.4% in Municipal Abattoir of Haromaya, Ethiopia. The highest prevalence of the disease recorded in this study might be due to the seasonal variations of the year in which the samples were collected.

The disease is more prevalent in wet and/or rainy seasons where snail hosts are plenty. Moreover, the difference might be due to the difference of the climatic conditions and geographical regions such as rainfall, temperature and humidity. The present study was also designed to determine prevalence and assess risk factor associated with ovine fasciolosis. It revealed that an overall prevalence of 39.06% based on coprological examinations. The prevalence of the disease in the study area might be attributed to the favorable ecological factors for snails' intermediate host and the parasite. In study area, Statistical analyses were shows no significant variation in infection rate between body condition and sex. However, there is statistical significance between age groups.

Epidemiologically, the area is favorable for the development and multiplication of intermediate hosts. Generally, the prevalence was strongly associated with feeding behavior of ovine. The prevalence of ovine fasciolosis associated with grazed at the dry land with water dry area [17]. Accordingly, strategic application of fluckicide and provision of worm safe pasture and water provide better considerable success in the prevention/control of fluke infection in the study area.

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.

Conclusion

Fasciolosis is the major burden for sheep production by direct or indirect losses at different part of our country. The present study showed that ovine fasciolosis was a widely distributed disease with high infection rate in the study sites.

The occurrence of ovine fasciolosis in this study suggested that there was the presence of favorable ecological and climatic conditions for the development and survival of the *Fasciola* species as well as intermediate hosts. The study demonstrated significant economic impact of the disease directly and indirectly affecting ovine productivity.

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
 - Transportation and use of contaminated and infected feed with metacercaria from disease prevalence areas to others should be restricted.
 - 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 marshy areas.
 - Further study on epidemiology, ecology and biology of intermediate host snail should be carried out for better control of disease
5. Mulatu H, Addis M (2011) Study on the Prevalence and Risk Factors of Ovine Fasciolosis in Small Ruminants in and Around Hirna Town, Ethiopia *Global Veterinaria* 7: 497-501.
 6. Keyyu JD, Monrad J, Kyvsgaard NC, Kassuku AA (2005) Epidemiology of Fasciolagigantica and Amphistomes in cattle on traditional, small-scale dairy and large scale dairy farms in the Southern Highlands of Tanzania. *Trop An Health Prod* 37: 303-314.
 7. Urquhart GM, Armour J, Duncan JL, Dunn AM, Jennings FW (1996) *Veterinary Parasitology* (2nd Edn). Blackwell Science Ltd., Oxford, Pg No's: 224-234.
 8. Radostits OM, Gray CC, Hinchcliff KW, Constable PD (2007) Disease Associated with trematodes and cestodes. In: *Veterinary Medicine, Textbook of the diseases of cattle, horses, sheep, pigs and goats*, 10th (Edn). Elsevier, Amsterdam, Netherlands, Pg No's: 1576-1580.
 9. Yilma JM, Malone JB (1998) A Geographic information system forecast model for strategic control of fasciolosis in Ethiopia. *Vet Parasitology* 78: 103-127.
 10. Molalege B, Nuradis I, Nahili A (2010) Study on the prevalence of ovine fasciolosis in and around Dawa-Cheffa, Kemissie. *African Journal of Agricultural Research* 5: 2981-2985.
 11. Thrusfield M (2005) *Veterinary epidemiology* (2nd Edn). Black well science UK, Pg No: 233.
 12. Urquhart G, Armour J, Duncan JL, Jennings FW (2007) *Veterinary Parasitology* (2nd Edn). Singapore, Longmann.
 13. Hansen J, Perry B (1994) The epidemiology, diagnosis and control of helminth parasites of ruminants. A hand book of International laboratory for research on Animal Disease, Nairobi, Kenya: 31-36.
 14. Tasawar Z, Minir U, Hayat CS, Lashari HM (2007) The prevalence of Fasciola Hepatica in goats around multan. *Pakistan Vet J* 271: 5-7.
 15. Asredie T, Shifaw A (2015) Coprological studies on the prevalence of ovine fasciolosis in debreberhane agricultural research center, ethiopia. *European Journal of Biological Sciences* 7: 103-107.
 16. Nuraddis I, Mohammed Y, Wubit T, Yosef D (2016) Prevalence of bovine fasciolosis in municipal abattoir of Haramaya, Ethiopia. *Food Science and Quality Management* 48: 38-43.
 17. El-tahawy AS, Bazh EK, Khalafalla RE (2017) Epidemiology of bovine fascioliasis in the Nile Delta region of Egypt: Its prevalence, evaluation of risk factors, and its economic significance. *Vet World* 10: 1241-1249.

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Conflict of Interests

The author declares that there is no conflict of interests regarding the publication of this paper.

References

1. Tesfahewet Z, Negash K (2012) Prevalence of Fasciolosis in Cattle, Sheep and Goat in Dire Dawa, Haramaya University, College of Veterinary Medicine, Department of Parasitology and Pathology, Dire Dawa.
2. Ahmed EF, Markvichitr K, Jumwasorn S, Koonawooththin S, Achoothesa JS (2007). Prevalence of Fasciola species infections of sheep in the middle awash river basin, Ethiopia. *Southeast Asian. Journal of Tropical Medicine and Public Health* 38: 51-52.
3. Zgabeher EG, Amede Y, Bekele M (2012) Prevalence of Ovine Fasciolosis in Adigrat, North East Ethiopia. *Global Veterinaria* 9: 92-96.
4. Abdulhakim Y, Mekonnen A (2012) An abattoir study on the prevalence of fasciolosis in cattle, sheep and goats in DebreZeit town, Ethiopia. *Global Veterinaria* 8: 308-314.



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