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Coprological Prevalence And Associated Risk Factors Of Bovine Fasciolosis In And Around Zenzelma, Bahir Dar, Ethiopia

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Abstract

A cross-sectional study was conducted to know fasciolosis prevalence in cattle plus identifying the risk factors associated in and around Zenzelma town, Bahir Dar Zuria woreda, west Gojam administration Zone. The study was done in 2016. Parasitological examination of feaces collected from 192 cattle and examined using fecal sedimentation technique to understand fasciolosis prevalence was done. The study observed 26% prevalence at the study area. Associated predisposing factors taken are; site, sex, breed and age did not show a significant effect for the infection to occur (P>0.05). However, there was a statistically significant association of fasciolosis beteween body condition of cattle's (p<0.05) in which 38.8%, 27.3% and 10.2% of prevalence obtained in poor, medium, and good body conditions respectively. It was noticed that a highest prevalence rate of 38.8% was recorded in poor body conditioned animals. The study observed that the incidence of the infection was varying between study sites (i.e. 28.7%, 22.1%) in Gediro and Sifatra respectively. The current finding shows that fasciolosis in cattle is among the most economically important parasitic disease affecting cattle and common in areas around Bahir Dar. Hence, control strategies should be designed to minimize the occurrence of the infection.

Keywords: Cattle; Coprology; Zenzelma; Fasciolosis; Prevalence; Risk factor

Introduction

Ethiopia have the largest livestock population in Africa, of roughly 53.99 million animals out of this total cattle population, the female cattle constitute about 55.48% and the remaining 44.52% are male cattle. However, this great potential is not properly used as a result of disease, malnutrition and other management problems [1].

Parasitism is amongst the major concerns for the development of livestock sector in tropics. Fasciolosis is one of veterinary important parasitic diseases of ruminants' caused by digenean trematodes of the genus Fasciola commonly referred as liver flukes [2]. As an etiological agents, *Fasciola gigantica* and *Fasciola hepatica* are the common species of fasciola. Fasciolosis may infect all domestic animals, human and many wild species, but of economical important in sheep and cattle.

It has direct economic impact in increasing condemnation of liver, but far more effects are decreased animal productivity, lower calf birth weight and reduced growth in infected animals and cost of animal treatment. The spread of the disease largely depends on the intermediate host's ecology (genus Lymnaea) [3]. *Lymnaea natalensis*, aquatic snails is important for *F. gigantica* whereas *L. truncatula*, an amphibious snail with wide distribution throughout the world, is an intermediate host for *F. hepatica*.

Temperature of 10°C or above is necessary for both snails to breed and for the development of parasite. In Ethiopia, *F. hepatica* and *F. gigantica* infections occur in areas above 1800 m.a.s.l, and below 1200 m.a.s.l, respectively which has been attributed to variations in the climatic and ecological conditions such as rainfall, altitude and livestock management system. Between these altitude limits, both species exist and mixed infections prevail [4].

The life cycle of both species is typical of digenetic trematodes characterized by indirect life cycles. Highlands contain more of water logged marshy areas, provide suitable habitat all the year for snail multiplication [5]. Prophylactic programs based on local epidemiological information are needed for good control strategies in Ethiopia.

Therefore, the objective of this study was:

- To estimate the occurrence status of fasciolosis in cattle in and around the study area
- Identifying risk factors associated with fasciolosis in bovine

Material and Methods

Study area description

The study was conducted in and around Zenzelma town, Bahir Dar zuria woreda, west Gojam administrative zone. Bahir Dar is the capital city of Amhara regional state that is found 565 km distance from the capital city of Ethiopia (Addis Ababa) with an altitude 1500-2600 m.a.s.l. It is located between 12*29'N latitude and 37*29'E longitude and annual average rainfall and temperature ranges 1200-1600 mm and 8-3°C [6]. 70% of the land is covered by plain platues, various bush types, low weeds mainly ever green landmasses planted with major agricultural products on some semi humid highlands. Woredas around the city has around 152,772 livestock population in which (121,470 cattle, 14,322 sheep, 9,141 goats and 7,839 equines, 36,666 poultry).

Study animals

The study animals were cattle that found in the selected areas around Zenzelma. The cattle includes both cross and local breeds. A total of 192 cattle of all age groups and both sexes are randomly selected on the areas where they are grazing in the two different origins. Average cattle age is determined using dentition and classified as young and adult [7,8]. The scores for body conditions of cattle were recorded from previous study.

Study design

The PRV Bartha-K61 vaccine with a virus titer of 105.0 TCID50/dose was purchased from Harbin Pharmaceutical Group Bio-vaccine Co., Ltd. (Harbin, China). According to the quality standards for this vaccine [9], the virus titer of the qualified product is >5,000 TCID50/dose.

Animal experiments

The sample size was calculated using the formula given by Thrusfield, 95% confidence interval with 5% precision and 19.2% expected prevalence was used. Fecal samples were collected from 192 cattle by random sampling method. Fresh fecal samples were collected by inserting two fingers directly to the rectum of cattle using disposable plastic gloves and placed in clean screw capped universal bottles [10]. Each sample was labeled with date of submission, age, sex, body condition and place of origin. Samples were preserved with 10% formalin solution to avoid the eggs development and hatching. Samples that were not processed within 24 hour were stored in a refrigerator at four degree centigrade until all fecal bottles are processed and examined. Sedimentation technique was used to detect fluke eggs by taking 3 g of fecal sample from each bottle, adding 45 ml of water, thoroughly mixing and straining to remove extra debris material [11]. Dropping a small drop of the sediment on the microscopic slide and identifying fasciola egg from other fluke eggs and methyl blue is used to distinguish Paramphistomum and Fasciola eggs having similar shapes.

Data analysis

The collected data was entered and stored into Microsoft Excel spread sheet 2007. The data were thoroughly screened for errors and properly coded before subjecting to statistical analysis. The data were imported from the Microsoft Excel and analyzing using Statistical Package for Social Sciences (SPSS) software version 16.0. Descriptive statistics was used to quantify the prevalence of fasciolosis [12,13]. Chi-square test used to assess the association of the potential risk factors like age, sex, body condition, breed and site for the occurrence of the fasciolosis. A 5% significance level was used to know whether there are significant differences or not.

Results

From a total of 192 fecal samples taken from cattle for coprological examination 50 cattle were found infected with fasciolosis [14]. The overall prevalence of fasciolosis in bovine was 26.0%. The prevalence of fasciolosis has no statistically significant difference associated with the study site as indicated in **Table 1 and Figures 1-3**.

Table 1: Prevalence of fasciolosis in different sites of the study área.

Site	Laboratory result		Total	Chi-square	p-value
	Positive	Negative			
Gediro	33(28.7%)	82(71.3%)	115(100.0%)	1.049	0.306
Sifatra	17(22.1%)	60(77.9%)	77(100.0%)		
Total	50(26.0%)	142(74.0%)	192(100.0%)		

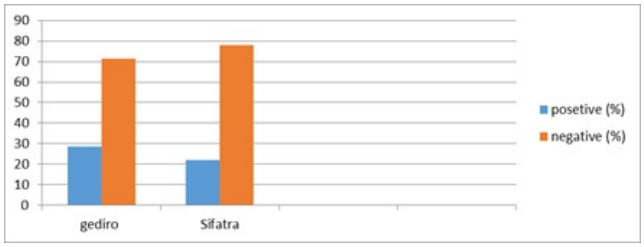

Figure 1: Comparison of positive and negative results on fasciollosis.

Table 2: Prevalence of fasciolosis associated with age groups.

Age	Laboratory result		Total	Chi-square	p-value
	positive	negative			
<4 years	14(21.5%)	51(78.5%)	65(100.0%)	1.249	0.536
4-8 years	26(29.5%)	62(70.5%)	88(100.0%)		
>8 years	10(25.6%)	29(74.4%)	39(100.0%)		
Total	50(26.0%)	142(74.0%)	192(100.0%)		

This study was also conducted comparison on the effect fasciolosis among different age groups but no statistically significant difference was observed on the prevalence of fasciolosis as indicated in **Table 2**.

The study samples included both local and cross breeds to compare if there is a variation in prevalence among the breeds but no statistically significant difference was observed on the prevalence of fasciolosis among animals of the different breeds as indicated in **Table 3**.

Table 3: Prevalence of fasciolosis associated with breed.

Breed	Laboratory result		Total	Chi-square	p-value
	positive	negative			
Local	31(24.8%)	94(75.2%)	125(100.0%)	0.287	0.592
Cross	19(28.4%)	48(71.6%)	67(100.0%)		
Total	50(26.0%)	142(74.0%)	192(100.0%)		

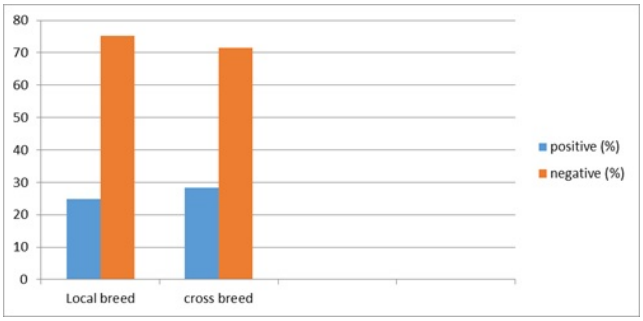

Figure 2: Comparison of breeds based on their susceptibility for fasciollosis.

In this study, animals with poor, medium and good animals were among the sample animals. The comparison indicated that there was a significant difference of the disease among animals of different body condition (P<0.05) as shown in **Table 4**.

Table 4: Prevalence of fasciolosis based on body condition.

Body condition	Laboratory result		Total	Chi-square	P-value
	positive	Negative			
Poor	28(38.8%)	41(61.2%)	67(100.0%)	13.437	0.001
Medium	18(27.3%)	48(72.7%)	66(100.0%)		
Good	6(10.2%)	53(89.3%)	59(100.0%)		
Total	50(26.0%)	142(74.0%)	192(100.0%)		

Sex was another factor studied with the prevalence of fasciolosis but no statistically significant difference was observed on the prevalence of fasciolosis associated with sex category in this study (**Table 5**).

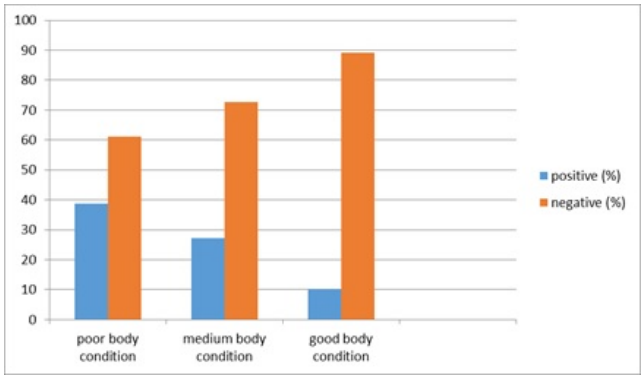

Figure 3: Prevalence of fasciolosis based on body condition.

Table 5: Prevalence of fasciolosis associated with sex.

Sex	Laboratory result		Total	Chi-square	P-value
	positive	negative			
Male	30(28.0%)	77(72.0%)	107(100.0%)	0.5	0.48
Female	20(23.5%)	65(76.5%)	85(100.0%)		
Total	50(26.0%)	142(74.0%)	192(100.0%)		

Discussion

The total prevalence is high and it is in line with the report by Amsalu et al. which is 27.22% around Hawassa city with 23.96% report at Andassa livestock research center.

The prevalence is relatively higher than the report made by Yitayal et al. which is 19.2% in Zenzelma; Ibrahim et al. which is 12.4% prevalence in Kombolcha; Negesse et al. with 15.9% at Wolega zone and similar 15.9% prevalence by Tilahun et al. at Nekemte veterinary clinic [15,16].

The prevalence in this study was slightly lower than a report by Asmare and Samuel with 30.02% prevalence around Dangila but on the other side, the prevalence was far more lower than the previous studies by Yilma and Mesfin (33.42%) in North Gonder, Fikirtemariam et al. (36.72%) around Bahir Dar, Shiferaw et al. (42.25%) around Assela and Biniam et al. (41.41%).

All the above comparisons of the prevalence of fasciolosis in this study with other reports may be associated majorly with the variation in the study seasons. Regardless of the season the difference in management system is another factor for the difference [17]. Factors like agro ecological difference, difference in climatic conditions, presence of favorable condition for the growth of snail in different study areas should also be considered for variation between different reports and relative to this study [18].

Most of earlier research reports indicated that there was a high prevalence of fasciolosis relative to this study and this could be due to a gradual improvement of service delivered by veterinary clinics and veterinarians [19]. In the other hand

higher prevalence reports found recently may be associated with study areas which are convenient for the growth of snails like marshy areas. Farmers are also getting good awareness and experience through veterinary extensión [20].

The present report indicated that there was no significant difference among the age groups which was the same to the report by Yeneneh et al. and disagree with Solomon and Abebe, Yilma and Mesfin, Asmare and Samuel, Shiferaw et al. and Biniam et al.

There was no significant variation among breed which the same with the result revealed by Yeneneh et al. and different from Yitayal, Asmare and Samuel and Biniam et al. The difference could be due to unknown blood level of the cross breeds [21].

The present finding did not show significant difference with the study sites and this report was in line with Yitayal et al. and Asmare and Samuel. However, it was not the same with Fikirtemariam et al. The reason for this could be due to there was that much difference between the study areas related to favorability for the growth of snails [22].

The study showed that there was no significant variation among sex of animals which the same with reported by Fikirtemariam et al., Solomon and Abebe and disagree with Shiferaw et al. The reason that sex is not an associated factor for fasciolosis in this study could be due to the management system is similar for both sexes that means they have equal exposures for contaminated grass and in this study area the management and treatment is the same for all animals [23].

There was significant variation between different body conditions of animals which the same with Asmare and Samuel, and it was different from Yitayal et al. and Shiferaw et al. Infection rate in poor body was higher than medium and good. This could be due to differences in their resistance for concurrent infection and also fasciolosis itself. Concurrent infection and chronic disease on animals with poor body condition may result the animals to be susceptible for fasciolosis.

Conclusion and Recommendations

The present study conducted on prevalence of bovine fasciolosis in and around Zenzelma district indicated that fasciolosis is highly prevalent parasitic disease affecting the health and productivity of animals and body condition is an important risk factor for fasciolosis to occur within cattle. The occurrence is highly associated to the presence of suitable environmental conditions for snails to live and grow. Draining of marshy areas, utilization of swampy areas for crop production, strategic worm control is mandatory.

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