



Comparison of Two Parasitological Tests and Post Mortem Examination to Detect Prevalence of Bovine Fasciolosis at Ambo Town Municipal Abattoir, West Shewa Zone, Ethiopia

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Abstract

A cross sectional study was conducted from March 5, 2013 to June 28, 2013 in Ambo town municipal abattoir to assess prevalence of bovine fasciolosis and compare tests used for bovine fasciolosis. Direct smear, sedimentation and post mortem examination were the tests used for comparison. Post mortem examination was considered as gold standard test. Data were collected by using primary data at the abattoir; Kappa (K) and percentage were utilized to assess agreement of tests and prevalence, respectively. A total of 60 fecal samples were collected from cattle brought to the abattoir for direct smear and sedimentation techniques. Adult *Fasciola* were detected from slaughtered cattle at the abattoir. An overall prevalence of 21.66% (13 of 60), 18.33% (11 of 60) and 13.3% (8 of 60) were obtained by post mortem examination, sedimentation and direct smear techniques, respectively. At species level, 69.23% (9 of 13 positive cases) *Fasciola hepatica* and 84.62% (11 of 13 positive cases) *Fasciola gigantica* prevalence were observed. From 13 positive samples, 7 (53.85%) were mixed. Sedimentation showed higher agreement with post mortem examination (K = 0.896) than direct smear with post mortem examination (K = 0.715). The specificity of direct smear, sedimentation and post mortem examination were 61.53%, 84.6% and 100%, respectively. In conclusion, presence high prevalence of mixed infestation indicated that presence of suitable ecology for both *Fasciola* species and sedimentation were considered as better test than direct smear. Therefore, control strategies and utilization of sedimentation technique to detect *Fasciola* egg for samples collected from live animals were recommended.

Keywords

Ambo, Bovine Fasciolosis, Direct Smear, Sedimentation, Prevalence, Post Mortem Examination

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Subject Areas: Veterinary Medicine

1. Introduction

Fasciolosis is an economically important parasitic disease caused by Trematode of the genus *Fasciola* that affects the hepatic parenchyma and established in bile duct. *Fasciola* is commonly recognized as liver flukes and responsible for wide spread morbidity and mortality in cattle characterized by weight loss, anemia and hypoprote-nemia. The two most important species are *Fasciola hepatica* (*F. hepatica*) which is found in temperate area and in cooler area of high altitude in the tropical and sub-tropicals where as *Fasciola gigantica* (*F. gigantica*) is predominated in tropical area [1]. In Ethiopia, *F. hepatica* and *F. gigantica* infections occur in area above 1800 m and below 1200 m above sea level, respectively which has been attributed to variation in the climatic and ecological condition such as rain fall, altitude, and temperature and livestock management system. In between these altitude limits, both species are coexisting where ecology is conducive for both snail host, and infections prevail [2].

Fasciolosis caused by *F. hepatica* and *F. gigantica* is one of the most prevent infectious of ruminant in different parts of Ethiopia [3]. In cattle, it occurs commonly as chronic disease and the severity often depends on nutritional status of the host [4]. It causes a substantial economic loss which includes death, loss in carcass weight, reduction in milk yield, condemnation of affected liver, declined production and productive performance, exposure of animal to another disease due to secondary complication and cost of treatment expresses.

Both *F. hepatica* (high land) and *F. gigantica* (low land) type of liver flukes cause severe losses in Ethiopia where suitable recognized condition for the growth and multiplication of intermediate host, snail, are available [5]. Despite the economic loss incurred and wide spread distribution of fasciolosis in the country, significant laboratory test should have to be checked for their sensitivity and agreement with gold standard test to differentiated the disease at national and regional level; and there was no work done on comparison of prevalence of fasciolosis using different tests in Ambo town municipal abattoir yet. Therefore the objective of the present study was assess prevalence and to compare different tests like direct smear and sedimentation with post mortem examination on bovine fasciolosis at Ambo town municipal abattoir.

The objective of this study was:

To compare two parasitological tests and post mortem examination to detect prevalence of bovine fasciolosis in West Shewa Zone.

2. Materials and Method

2.1. Study Area

The study was conduct on local breed cattle slaughtered at Ambo town municipal Abattoir from March-5-2013 to June-28-2013. Ambo town is administrative town of West Shoa zone and located at 8°59'N 37°51'E/8.983°N 37.85°E/8.983; 37.85 and an elevation of 2101 meters above sea level and 114 km West of Addis Ababa. The study area receives mean annual rain fall of 900 mm (range of 800 - 1000 mm) and annual temperature 15°C - 29°C with average temperature of 22°C.

2.2. Study Design, Animal and Sampling Method

A cross sectional study was conducted on 60 adult male cattle using simple random sampling method from 180 of cattle slaughtered at abattoir. All study cattle were local breed. The animals were transported to Ambo town municipal abattoir from different districts around Ambo district and from Ambo district.

2.3. Study Methodology

2.3.1. Ante Mortem Data Collection and Fecal Sample Collection

All information (cattle data like ID No., sex, breed, age and origin) of the animal was collected from the owner/ attendant when cattle were brought to the slaughter house. The fecal sample was collected per rectum from the animals using disposable glove in to universal bottle. Then the sample was transported to Ambo University Ve-

terinary Laboratory Technology Department laboratory and direct smear and sedimentation techniques were used to detect egg of the parasite following procedures for these techniques ([Annex 1](#)).

2.3.2. Postmortem Examination

During post mortem examination the general examination like palpation and inspection were conducted followed by incision and examination. Gross identification of affected organ had been conducted depending on color change, consistency and shape. The parasites were collected from liver and bile ducts of the animals and identified by naked eye using identification key, such as leaf-shape, Pointe of the posterior, and widens at the front or interiorly and oral sucker.

2.4. Data Management and Analysis

Collected data was entered and stored in to Ms Excel. Percentage and Kappa were used to determine prevalence and agreement tests (sedimentation and direct smear techniques with post mortem examination, which was considered as gold standard test) (Cohen's Kappa is measure of agreement between the two individuals when two binary variables are attempts by two individuals to measure the same thing and Kappa of 1 indicates perfect agreement, where as a kappa of 0 indicates agreement equivalent to chance [6]). Sensitivity of tests was calculated for the tests. In all cases, 95% confidence interval was utilized.

3. Results

3.1. Prevalence

An overall prevalence of 13.33%, 18.33% and 21.66% was obtained by direct smear, sedimentation, postmortem, respectively ([Table 1](#)).

Fasciola gigantica was detected at higher prevalence rate (84.62%) than *F. hepatica* ([Table 2](#)).

3.2. Comparison of Tests

Sedimentation technique had higher sensitivity (Se = 84.6%) than direct smear (Se = 61.53%) when compared with post mortem examination ([Table 1](#)). Higher agreement was obtained between sedimentation and post mortem examination (K = 0.896) than between direct smear and post mortem examination (K = 0.715) as shown in [Table 3](#).

4. Discussion

During the present study, the overall prevalence for bovine fasciolosis in study area was found to be 23.33% by post mortem examination (gold standard test) which is comparable with that of a previous study by [7] who reported a prevalence of 30% at the Addis Ababa Abattor. However it is lower than report of [8] who reported 42.3% at the same study area and [9] who reported 30.68% at Addis Ababa abattoir. Similar annotations and assertions were previously made by [10].

Table 1. Prevalence of bovine fasciolosis by different tests and their sensitivity.

Techniques	No. examined	Positive	Prevalence	Sensitivity
Direct smear	60	8	13.33%	61.53%
Sedimentation	60	11	18.33%	84.6%
Postmortem	60	13	21.66%	100%

Table 2. Prevalence of detected *Fasciola* species.

Species	No examined	Positive	Prevalence from positive cases (%)
<i>F. hepatica</i>	60	9	69.23
<i>F. gigantica</i>	60	11	84.62
Mixed	60	7	53.85

Table 3. Comparison of tests agreement with gold standard test (post mortem examination).

Tests	Post mortem examination		Sub-total	Kappa
	Negative	Positive		
Direct smear	Negative	47	52	0.7157
	Positive	0	8	
	Subtotal	47	13	
Sedimentation	Negative	47	49	0.896
	Positive	0	11	
	Subtotal	47	13	

According to postmortem examination of present study, the prevalence of *F. gigantica* (84.62%) was greater than the prevalence of *F. hepatica* (69.23%). This is in line of agreement with occurrence of *F. hepatica* and *F. gigantica* in area above 1800 m and below 1200 m sea level, respectively. This indicated that more number of animals that were slaughtered at Ambo town municipal abattoir during study period come from low land area.

Also 53.85% of the cases were mixed infection of both species in the current study. Similar observations and assertions were previously made by [11].

The present study also revealed as sedimentation is more sensitive than direct smear. Higher agreement was observed between sedimentation technique and post mortem examination than between direct smear technique and post mortem examination [12]. This is related to concentrating ability of sedimentation technique. Post mortem examination was considered as gold standard since follow of bile from bile duct is intermittent. Fecal sample collected during pause stage and lower egg count may lead to false negative result. Infection due to immature flukes often results in nil fecal egg output [13].

5. Conclusions and Recommendations

In conclusion, fasciolosis is widespread ruminant health problems and causes significant economic losses to the livestock industry in Ethiopia. High prevalence of bovine fasciolosis was obtained in the current study with higher prevalence rate of *F. gigantica* than *F. hepatica*. Mixed infection with both species was also observed at high level. Sedimentation technique had shown higher sensitivity and agreement measurement than direct fecal smear when compared with post mortem examination. Based on these points, the following ideas were recommended:

- Utilization of strategic control and prevention methods to reduce the prevalence by concerned organs.
- Detection of fasciolosis using sedimentation when the present options for examination are only direct smear and sedimentation.

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Annex 1: Procedures of Direct Smear and Sedimentation

Direct Smear procedure:-

- Small amount of faces was taken and placed on slide by spoon.
- Small drop water was dropped and mixed with slowly on the slide.
- Debris and large faces removed and covered with cover slip.
- Then it was seen under 10× objective microscope.

Sedimentation procedure:-

- Three gram of faces was measured in to paper cup, using tongue depressor to move faces in to the mortal.
- About 42 ml of tap water was added.
- The faces dispersed in the water vigorously with pestle or tongue depressor.
- Swirl and pour mixture was quickly through the strainer to the cap.
- Swirls and pour sieved mixture was transferred in to centrifuge tube.
- Then balanced and centrifuged at 15,000 pm for at least 2 min.
- The supernatant was decanted.
- The sediment stained by adding a drop of 1% methyl blue solution.
- Drop of stained sediment transferred into slide; cover with cover slip.
- Sediment was examined under microscope starting with 10× objective lens.