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Research Article

Prevalence of Dairy Cattle Fasciolosis in and around Wolayta Sodo, Southern Ethiopia

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Abstract

Fasciolosis is an economically important parasitic disease of cattle in Ethiopia. The goal of the study was to determine the prevalence of fasciolosis in dairy cattle. A cross sectional study was carried out from January, 2019 to May, 2019 in Wolayta Sodo, Southern Ethiopia. For this, a total of 384 feacal samples were randomly collected from local dairy cattle and all samples were subjected to standard sedimentation test was transported to wolayta Sodo regional laboratory, Southern Ethiopia. In the laboratory, coprological examination was performed to detect the presence of fasciola egg. Fresh fecal samples for parasitological examination were collected directly from the rectum by using disposable plastic gloves and placed in clean screw capped universal bottles. Each sample was labeled with date of submission, age, body condition and place of origin (Sub city). Samples were preserved with 10% formalin solution. The overall prevalence of bovine fasciolosis was found to be 91 (23.7%) positive samples. From the various risk factor analyzed, age categories of cattle, body conditions and origin influence were found to be not significantly associated (p>0.05) with the prevalence of dairy cattle fasciolosis. When considered the relationship with age 4-8 years (23.72%) and >8 years (23.68%) and as regards to body condition, medium (23.75%) and fat (23.66%) was recorded; and the prevalence was varying among different origin that is lower (23.07%) and higher (24.45%) in different origin of the study area.

Keywords: Dairy cattle; Fasciolosis; Prevalence; Wolayta Sodo

Abbreviations

KMS: Kilometers

MASL: Meters above Sea Level

USD: United States Dollar

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Introduction

Ethiopia has the largest livestock herd in sub Saharan Africa, with an estimated cattle population of 52 million, sheep population of 25.5 million, and goat population of nearly 24 million. Cattles are the most economically important livestock species with high estimated population and the majorities are indigenous zebu breed. In spite of the presence of huge number of ruminant population, Ethiopia fails to optimally exploit these resources due to a number of factors such as recurrent drought, infrastructures problem, rampant animal diseases, poor nutrition, poor husbandry practices, and shortage of trained man power and lack of government policies for disease prevention and control [1].

Parasitic diseases have great impact on cattle productivity and welfare in all regions of the world. Infections with two groups of internal parasites liver flukes and gastrointestinal nematodes are commonly regarded as most detrimental for dairy cattle [2].

Bovine fascioliasis is a parasitic disease of cattle caused by trematodes usually Fasciola gigantica and rarely Fasciola hepatica in the tropical countries. Fasciolosis is an important zoonotic production limiting disease of ruminants [3]. Lymnaea snails are suitable intermediate hosts for Fasciola species and lives along the river banks [4]. Fascioliasis affects both domestic ruminants and humans. In humans, the disease is characterized by destruction of liver tissues and the bile duct [4]. Human fascioliasis is traced in 51 countries of the five continents [5]. When a grazing animal eats contaminated herbage, the metacercariae hatch, the newly excysted juveniles burrow through the gut wall and migrate into the liver. Immature fluke migrate through the liver parenchyma for 6-8 weeks before entering into bile ducts, where they mature and start producing eggs that can then be detected in faces [6].

The two most important species, Fasciola hepatica found in temperate area and in cooler areas of high altitude in the tropics and subtropics and Fasciola gigantica, which predominates in tropical area. Fasciola hepatica is found in area above 1800 m.a.s.l. In between these altitude limits, both species coexists where ecology is conductive for both snail hosts, and mixed infections prevailed [7].

The development of infection in definitive host is divided into migratory phase and the biliary phase [8]. The parenchyma phase begins when encysted juvenile flukes penetrate the intestinal wall. After the penetration of the intestine, flukes migrate within the abdominal cavity and penetrate the liver or other organs and cause lesion. The young flukes tunnel through the parenchyma then enter the small bile ducts where they migrate to the larger bile ducts and cause lesion [8].

Fascioliasis was first recorded as early as 2000 BC animal fascioliasis causes significant disease among sheep and cattle, causing severe physical wasting.The high prevalence of fascioliasis in cattle was conveyed in all areas and is a severe problem in many nations [9]. The major source of loss to domestic animal production in Africa, Asia, Tropical and Sub-tropical areas has been traced to fasciolosis [9].

It causes significant economic losses to global agriculture, estimated at N3 billion USD annually, through liver condemnation and reduction of milk and meat yields [10]. Food safety concerns are compelling reasons for meat inspection and condemnation of infected liver. This infection is a major veterinary disease and has recently been shown as a significant public health problem [11]. Human disease has been reported in five continents and about 2.4 million people are infected in 61 countries and much more are at risk of the infection [11]. There is a high prevalence of fascioliasis among herding communities in low income countries because of their constant close association with livestock that they keep [12].

A review of available literature strongly suggests that fasciolosis exists in almost all parts of Ethiopia [5]. The prevalence and economic significance has been reported form different parts of the country by different researchers [8]. However, there were no reportsregarding to dairy cattle fasciolosis in the Wolayta Sodo, southern part of Ethiopia.

Therefore, the objective of this study was:

- To determine the prevalence and distribution of dairy cattle fasciolosis in selected dairy farms in Wolayta Sodo town, southern region.

Materials and Methods

Study area

The study was conducted in Wolayta Sodo southern Ethiopia from January, 2019 to May, 2019. The town is located 383 kms southwest of Addis Ababa and it has a latitude and longitude of 6°54′N 37°45′E 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 all indigenous dairy cattle from different localities and their vicinity and categorized based on their age, location and body condition.

Herd management

The quantity of milk that can be depends primarily on factors such as, management and nutrition. Sometimes concentrate feeds are supplemented for milking cows. The animals were watered from Local River and spring water during wet season for animals which stayed at farm.

Study Design

The cross sectional study was conducted from January 2019 to May 2019 to determine the prevalence of dairy cattle fasciolosis in Wolayta Sodo.

Data recording

While collecting fecal samples from study animals, all data were recorded with pre-designed format and entered to computer using Microsoft excel spreadsheet. The individual animal details such as animal ID based on location, age and body condition were registered together.

Coprological examination

While the initial recording of the animal detail is taken, fecal samples (approximately 10g) were collected directly from the rectum of the animal. Sample was carried out with inclusion of age, body condition and sub cities. The fecal sample was then put into 10% formalin filled universal sampling bottle. After labeled with specific identification number, each sample was transported to Wolayta zone regional laboratory, Parasitology department for coprological examination. The fecal samples were kept at 4 0c until all are processed and examined. Sedimentation technique was employed to assess the presence of trematode eggs through repeated dilution of the fecal suspension and sedimentation of the eggs, which are heavier than most of the fecal particles [13].

Statistical analysis

The data were analyzed using SPSS software version 17 (SPSS Inc., Chicago, Illinois, USA). The association between prevalence and examined animals data (age, body condition and location) were evaluated using Chi-square test.

Sample size determination and sampling method

The animals were selected by using simple random sampling method to determine the sample size; an expected prevalence of 50% was taken in to consideration since there was no earlier coprological research work on fasciolosis in the area. Therefore, the four sub cities were selected by simple random sampling technique from study area. The desired sample size for the study was calculated using the formula given by Thrusfield (1995) with 95% confidence interval and at 5% level of precision.

1.962 (Pexp) (1 - Pexp)/d2

1.962 (0.5) (1 - 0.5) Therefore, N = (0.05) 2

Where N = sample size,

P = expected prevalence,

d = desired level of precision.

Totally, 384 dairy cattle were randomly sampled in Wolayta Sodo to determine the prevalence rate.

Results

Over all prevalence

Out of 384 cattle examined for the prevalence of bovine fasciolosis in Wolayta Sodo, 91(23.7%) cattle were found to be positive for fasciolosis. The higher prevalence was recorded in Mehal sub city (24.44%) and lower prevalence was in Zuria (23.07). Dairy cattle are randomly selected from different herds. Statistical analysis showed that there is no statistical significance (P > 0.05) difference between sub cities (Table 1).

Age specific prevalence

From the total numbers of 384 randomly selected and during the study period, dairy cattle were classified based on their age (4-8 years) and (> 8 years). From 118 examined (4-8 years) cattle, 28 (23.72%) were positive of fasciolosis and among the 266 examined (>8 years) cattle, 63 (23.68%) were positive for fasciolosis with an overall prevalence of 23.7%. Statistical analysis showed that there is no statistical significance (P > 0.05) difference between age group (Table 2).

Body condition specific prevalence

From 160 examined, medium body condition about 38 (23.75%) were positive for fasciolosis and among of 224 examined fat body condition 53 (22.66%) were positive for fasciolosis. Statistical analysis showed that there is no statistical significance (P > 0.05) difference between body condition score (Table 3). Body scoring of the cattle was categorized based on the method of Nicholson and Butter [14] and identified as: medium, fat, and obese.

Discussion

Fascioliosis 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.

Bovine fasciolosis exists in almost all regions of Ethiopia. However, the prevalence, epidemiology and fasciola species involved vary with locality that were caused by the variation in the climate and ecological conditions such as altitude, rainfall, temperature, livestock management systems [1]. 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 [9].

Our study used intensive data collection from different sources to investigate issues relevant to the control of fasciolosis on four different dairy farms.

The present study provides that the prevalence of bovine fasciolosis in dairy cattle is 91 (23.7%) and there was nostatistically significant association (P>0.05) in prevalence between ages and body condition of dairy cattle. This finding showed that both age and body condition are equally susceptible and exposed to the infection. Sedimentation technique was employed to assess the presence of trematode eggs through repeated dilution of the fecal suspension and sedimentation of the eggs, which are heavier than most of the fecal particles. The other study has not been conducted in Wolayta Sodo sub city dairy farms to compare with other studies.

The present study demonstrated that the overall prevalence of major dairy cattle fluke infections at Wolayta Sodo sub city is moderately high when compared to the study conducted and recorded in Addis Abeba 14.83% [15] and Bahirdar 12.4% [16].

However, high prevalence of bovine fasciolosis has been reported by other researchers such as Bahru and Ephraim in kaffa (86%) [17], Yadetain Western Showa (82.5%) [18], Dagne in and around Debre Berhan (80%) [19], Fekadu around Bahir Dar (60.2%) [20] and Wondwossen in Arsi Administration region (53.72%) [21]. However, the present prevalence was lower when compared with the above reports and this may be due to the expansion of animals' health post in the area and the intervention of nearby private veterinary drug shop and pharmacies. This enables the owners to have more access for disease control and intervention.

Name of Sub city	No of Examined Cattle	No of Positive	Prevalence (%)	No of Negative	Prevalence (%)	P-Value	CI (95%)
Merkato	93	22	23.66	71	76.35	0.886	0.801-1.211
Zuria	104	24	23.07	80	76.93		
Arada	97	23	23.72	74	76.29		
Mehal	90	22	24.45	68	75.56		
Total	384	91	23.7	293	76.3		

Table 1: Coprological Prevalence of bovine fasciolosis based on sub city.

Age (years)	No of Examined	No of Positive	Prevalence (%)	No of Negative	Prevalence (%)	P-Value	CI (95%)
4-8	118	28	23.72	90	76.27	0.999	0.843 -1.185
>8	266	63	23.68	203	76.32		
Total	384	91	23.7	293	76.32		

Table 2: Prevalence of bovine fasciolosis based on age.

Body Condition	No of Examined	No of Positive	Prevalence (%)	No of Negative	Prevalence (%)	P-Value	CI (95%)
Medium	160	38	23.75	122	76.25	0.987	0.617-1.606
Fat	224	53	23.66	171	76.34		
Total	384	91	23.7	293	76.3		

Table 3: Prevalence of Bovine fasciolosis based on body condition.

The major feed resources at Wolayta Sodo are almost natural pasture in the form of grazing land which is seasonally water logged and the area lack clean piped water to animals increasing the chance of exposure to fluke infection [22].

Moreover, epidemiologically the area is favorable for the development and multiplication of intermediate hosts. 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.

The prevalence of the disease in different sub cities of the study areas were very closely similar having Merkato (23.66%), Zuria (23.07%), Arada (23.72%) and Mehal (24.45%) with non-statistical significant difference ($p > 0.05$). This non-significant difference indicates that there is no difference in prevalence of the disease.

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 bovine fluke infection in the study area. The role of different epidemiological factors such as localities, age, body condition and the type of 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

The present study demonstrated in Wolayta Sodo, southern region. The outcome of this study confirmed that, dairy cattle fasciolosis was prevalent parasitic disease in the study area. The prevalence of fasciolosis has not been associated with location, age and body condition of the animals. However, the occurrence of dairy cattle 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 in the study area.

The following points of recommendations were forwarded:

- Awareness should be created for owners about disease transmission methods
- Animal should be treated twice a year in the rainy season and long dry season
- Supplementary feeding of animals should be recommended to improve the body condition of the animals to adapt the damage caused by the flukes
- Providing long term method of reducing population of the intermediate snail host either by draining of water lodged areas or using application of mulluscides combined with anthelminthic treatment to remove existing fluke
- Further study on epidemiology, ecology and biology of intermediate host snail should be carried out for better control of disease

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Conflict of Interests

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

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