

Prevalence and Risk Factors for Bovine Thelaziasis at Mersa Town of South Wollo Zone, Amhara Regional State, Ethiopia

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Abstract

A cross sectional study was conducted from April 2014 to June 2014 in Mersa Town of South Wollo Zone, Amhara Regional State to determine the prevalence of the disease in cattle associated risk factors responsible for the occurrence of the disease. A total of 384 cattle of both ages (98 young and 286 adult) sexes (203 male and 181 females) were examined using visual observation of the eyes by flushing the conjunctiva sac and lachrymal duct with sterile saline solution. The overall prevalence for thelaziasis was 18.23% (70 cases). Age, sex, body condition scores and management systems did not show any statistical significant difference ($P > 0.05$) in the prevalence for thelaziasis. The prevalence was higher in male (24.12%) than female (11.6%), age groups of young (26.53%) were higher than adult (18.38%) in animals kept in extensive (20.69%) than those kept in semi-intensive system (13.01%). The prevalence of bovine thelaziasis was recorded highest in poor (30.19%) than medium (17.79%) and lowest in good (14.48%) body conditioned score cattle. The results of the present study showed that bovine thelaziasis requires special attention considering its impact on cattle production and productivity.

Keywords: Cattle; Eyeworm; Prevalence; Shawora Alfa; Thelaziasis

Introduction

Ethiopia has the largest livestock inventories in Africa including more than 38,749,320 cattle [1]. *Thelazia* nematodes (Spirurida: Thelazioidea), are commonly known as eyeworms and cause ocular infections in animals. This genus of *Spirurida* represents one of the most specific taxon among nematodes because of its very close relationship with its intermediate and final hosts [2].

However, the immature and mature stages occur in the anterior chamber of the eye, thereby being exposed to the external environment. Therefore, it could be considered an "ectoparasite". The 16 species of this genus have been reported from ruminants. They have been documented in Europe (Italy, France, Switzerland and Germany), Asia (China, Japan, Korea and Taiwan), North America (Canada), South America (Peru) and South Africa. The adult worms live under the eyelids, nictitating membranes and lacrimal ducts. However, they are also found in the nose and pharynx. They are milky-white worms, with males measuring up to 12 mm in length and females up to 18 mm in length. The numbers of pre-cloacal and post-cloacal papillae in males differ among species. Usually, the spicules are unequal. Also, the location of the vaginal opening and the number of cuticular transverse striations differ among species. The worms are viviparous, and the first-stage larvae are passed by females into the lachrymal secretions where they are ingested by non-biting *Diptera* flies. Larval development takes place in the thorax and abdomen of the vector, and infective stages are present in 18–25 days. Development to the adult stage takes place without migration, and the prepatent period is between 3 and 6 weeks. The first stage larva of *Thelazia* is very short-lived in the lachrymal secretions, only surviving a few hours, and transmission depends upon the continuous presence of the vectors. For

this reason, thelaziasis has a seasonal occurrence according to the seasonality of the intermediate hosts [3].

In final hosts, the larval stages and adults of *Thelazia* spp. cause clinical signs such as excessive lacrimation, epiphora, conjunctivitis, keratitis and corneal ulcers [4]. A definitive diagnosis is performed by the detection of the parasites in the conjunctival sac. Examination of lacrimal secretions may reveal eggs or first-stage larvae. Also, morphological differentiation has been done on some *Thelazia* spp. using scanning electron microscopy. Molecular characterization and phylogeny of some *Thelazia* species have been studied by Nadler et al. [5], Otranto et al. [6], and Traversa et al. [7]. Owing to the localization of the nematode, thelaziasis can be treated topically by direct application of drugs into the eyes. Removal of the adult parasites with fine forceps, using local anesthesia, is also helpful. Patients with an intraocular infestation with *Thelazia callipaeda* have been successfully treated with a pars plana vitrectomy. 2 mL of levamisole injected into the subconjunctival sac was more effective than levamisole given orally. Treatment of dog thelaziasis, caused by *T. callipaeda*, using a topical formulation of 10% imidacloprid and 2.5% moxidectin has been studied by Bianciardi et al [8].

There are different types of disease of cattle within the Alfa Shawora district that affect cattle which lead to loss of body condition, draft power and production. Among the reasons for eye infection, thelaziasis is the one and common problem within the district [9]. So to put forward the major effect of *Thelazia* and to plan the control strategy, studying around the problem within the district needs priority.

Therefore, the objectives of this study were:

- To determine the prevalence of bovine thelaziasis in Mersa Town, South Wollo Zone, Amhara Regional State
- To assess associated risk factors involved for the occurrence of thelaziasis in cattle in the study area.

Materials and Methods

Study area

The study was conducted in Mersa Town, South Wollo Zone, Amhara Regional State, which is found at North West of Ethiopia and 491 km away from Addis Ababa. According to the present document in Mersa Town has stock population comprise of 265,410 cattle, 86,912 goats, 27,462 sheep, 19,495 donkeys, 1122 mules, 18 horses and 22, 539 poultry population are estimated to exist. The rearing system of livestock population in the study area depending on natural grazing and crop residues and kept in traditional management system. The physical feature of the Woreda is hilly, sloppy, plain area, rivers and forested. The altitude of the study area ranges from 1500 to 2500 m.a.s.l. with average annual temperature of 20-25°C [9].

Study design and sampling methods

A cross sectional study was conducted from April 2014 to June 2014 to estimate the prevalence of bovine *Thelazia* and associated risk factors in Mersa Town. The study animals were selected by using simple random sampling method from animals that were brought to Mersa town veterinary clinic and cattle kept under individual households.

Study animals

Study population consists of cattle that were brought to Mersa Town veterinary clinic for different reasons and cattle kept under individual households were the target population. Cattle were categorized into groups according to Aiello and Mays (1998) young and adult, sex (male and female), breed (local and cross) and Ferguson (2011) divide the body condition score as (poor, medium and good) [10].

Sample size determination

The sample size requires for this study is determining based on sample size determination in random sampling for infinite population using expected prevalence of 50% and 5% desired absolute precision according to Thrusfield [11] as follows;

Where

$$n = 1.96^2 pex (1 - pex) / d^2$$

Where

n=required sample size

pex=expected prevalence

d²=desired absolute precision

Hence as for as the knowledge of the author concerned, there were no study did concerning thelaziasis of cattle in the study area, the sample size was estimated by using 50% expected prevalence with 95% confidence interval at 5% absolute precision [11].

Data analysis

The data obtained from this survey were entered in Microsoft worksheet excels. Then descriptive statistics were used to analyze the data using statistical package for social sciences (SPSS) software version 20.0. Chi-Square test (χ^2) with a computed p-value of less than 0.05 was used to estimate the statistical significance association of

bovine thelaziasis rate with sex, ages, body condition score, management system and altitude differences.

Results

Out of the total 384 cattle examined, 70 (18.23%) were found positive for bovine thelaziasis after thorough examination.

Prevalence of bovine thelaziasis infection based on age

The prevalence of the disease was higher in age group of young (26.53%) than that of age group of adult (18.38%). However, no any significance difference ($\chi^2=5.113$, $p=0.203$) between the age groups (Table 1).

Age	No. of cattle examined	No. of positive cattle	Prevalence (%)	X ² value	P value
Young	98	26	26.53	5.113	0.203
Adult	286	44	18.38		
Total	384	70			

Table 1: Prevalence of thelaziasis based on age groups.

Prevalence of bovine thelaziasis infection based on sex

The prevalence of bovine thelaziasis in male cattle (24.12%) was found greater than that of female (11.6%) there was also no significance difference ($\chi^2=2.149$, $p=0.716$) between both sex groups (Table 2).

Sex	No. of cattle examined	No. of positive cattle	Prevalence (%)	X ² value	P value
Male	203	49	24.12	2.149	0.716
Female	181	21	11.6		
Total	384	70			

Table 2: Prevalence of thelaziasis between male and female cattle.

Prevalence of bovine thelaziasis with regard to body conditions scores

The prevalence of bovine schistosomosis in poor body condition cattle (30.19%) higher than that of medium body condition (17.79%) as well as good body condition (14.88%). There was no statistically significant difference ($\chi^2=1.867$, $p=0.445$) (Table 3).

Body condition score	No. of cattle examined	No. of positive cattle	Prevalence (%)	X ² value	P value
Poor	53	16	30.19	1.867	0.445
Medium	163	29	17.79		
Good	168	25	14.88		

Total	384	70			
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Table 3: Prevalence of thelaziasis in cattle of different body condition score.

Prevalence of bovine thelaziasis based on management system

The prevalence of the disease was found higher in the extensive management system (20.69%) than that of semi-intensive management system (13.01%). However, there was no any significance difference between two management system of cattle ($\chi^2=0.158$, $p=0.373$) (Table 4).

Management system	No. cattle examined	No. positives cattle	Prevalence (%)	χ^2 value	P value
Extensive	261	54	20.69	0.158	0.373
Semi-intensive	123	16	13.01		
Total	384	70			

Table 4: Prevalence of thelaziasis based on management system.

Discussion

The overall prevalence of bovine thelaziasis was 18.23%. Despite the fact that no cases of bovine thelaziasis have been reported in the study area, this survey suggests that these parasites are relatively extensive. This level of prevalence of cattle *Thelazia* reported in this study is less than prevalence of 22% reported in cattle in endemic areas [12].

The current study indicated there was no significant different between age groups but it was higher infection rate young 26.53% than in adult cattle 18.38%. However, it contradicts with the work of Van Aken et al. [13] who reported that no age and sex preference of cattle in cases exposed to thelaziasis in cattle. Increase in prevalence of thelaziasis in cattle with young animals might be due to the fact that young cattle are not allowed to go far with adult animals for grazing, increasing the chance of exposure to vectors around the barn which is a suitable habitat for the vector that result in a high fly density and transmission of the disease.

The study result showed that there was no significant difference in the prevalence of thelaziasis due to difference in sex. This finding is in line with the results of Gutierrez et al. [14] who opined that both sexes have an equal chance of exposure for thelaziasis.

The highest prevalence of thelaziasis in cattle was observed in poor body conditioned (30.19%) cattle followed by cattle which had medium body condition (17.79%) while the lowest prevalence was observed in cattle which had good body condition (14.88%). This might be associated with the fact that effect of parasites can be influenced than animals on an inadequate diet which can influence levels of immunity.

Higher level prevalence of thelaziasis was observed in cattle kept in extensive management system (20.69%) compared to cattle kept in semi intensive management system (13.01%). The result of this study was in agreement with the work of Giangaspero et al. [15] who reported that thelaziasis infections were not found in cattle from herds managed indoors [16]. The reason might be associated with exposure

to transmitting vectors as cattle kept indoors are less exposed to face flies.

Conclusion and Recommendations

The result of the current study with overall prevalence of 18.23% indicated that the disease is prevalent in the study area. The age, sex, body condition score and management system were not found to have significant influence on the prevalence of thelaziasis in cattle.

The parasite is known by farmers affecting their cattle and they were tried to control it by using traditional practices and modern treatments. Sex, age, group, body condition, and management system of the area are important factors affecting occurrence of thelaziasis in cattle. High level of prevalence observed in male, five year and above old emaciated and extensively kept in low land.

Based on the above conclusion, the following recommendations are forwarded

- Awareness creation for the farmers should be given on the transmission and condition when flies are highly invested.
- Integrated prevention and control strategies of the disease should be given.
- Further studies should be conducted in the study area of assessing the species of the parasite and vectors as well as their seasonal dynamics and economic impact of the disease.

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