Study on Prevalence of Major Ixodid Ticks of Cattle, in Selected Sites of Harari Region, Eastern Ethiopia

Meseret Mohammed*, Tilaye Demissie*, Akinaw Wagari*

College of Veterinary Medicine and Agriculture, Addis Ababa University, Addis Ababa, Ethiopia

Email address:
meseretmohammed@gmail.com (M. Mohammed), tilayedemissie2002@gmail.com (T. Demissie), akinaw.wagari@yahoo.com (A. Wagari)

*Corresponding author

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Abstract: A cross sectional study was conducted on the identification and prevalence estimation of cattle tick species in selected areas of Harari Regional State from December 2015 to April 2016 with a total number of 384 cattle. Adult ticks were collected from main body regions of cattle which were kept under extensive management system and then transported to the parasitology laboratory of College of veterinary medicine, Haramaya University for identification. Out of the total 384 cattle examined, 229 (59.6%) were found to be infested by one or more tick species. In this study, 1201 adult ticks were collected and identified to genera level. Four tick genera (*Amblyomma*, *Rhipicephalus*, *Boophilus* and *Hyalomma*) were identified. The highest tick prevalence recorded was *Amblyomma* with a prevalence of 38.5 (n=462) followed by *Rhipicephalus* recording 29.9 (n=356) prevalence. The prevalence of tick infestation was found to be statistically significant (P= 0.032) among the age groups, with highest prevalence in adult than young animals. In female animals higher tick prevalence was obtained than male animals in the study area with no statistical significant difference. Special attention should be given to the control and prevention of ticks in the study area.

Keywords: Harari, Ticks, Prevalence

1. Introduction

Ethiopia have a huge number of live stock population having an estimated number of 53 million cattle, 55.51 million small ruminants, more than 1 million camels, 4.5 million equines and 40 million chickens respectively [5], which plays a significant role in the socio-economic life of the people. It is well known that livestock products and by-products in the form of meat, milk, cheese, and butter supply the needed animal protein that contribute to the improvement of the nutritional status of the people. The animals also play an important role in providing export commodities, such as meat, live animals, hides and skins to earn foreign exchange to the country. Besides, farmyard manure and wool are also important products of cattle and small ruminants [1].

In Ethiopia ticks are directly or indirectly involved in causing considerable financial losses to livestock industry accounts for 75% of the animal exports [24]. It is estimated about 1 million birr loss annually through rejection and down-grading of hides and skins in the country [9]. The introduction of exotic breeds with high productivity to different administrative regions in Ethiopia revealed that ticks are important vectors of several fatal diseases of animals. Ticks are common in all agro ecological zones of the country. In contrast to this huge economic loss caused by ticks, some of the owners neglect ticks as animal health problem, most of them have little knowledge about effect of tick on their animals and few know diseases transmitted to domestic animals by ticks [1].

In Ethiopia tick born disease contribute to the most important animal disease problem. In Ethiopia ticks occupy the first rank amongst external parasites and the economic losses in cured when they infest live stock particularly cattle’s. Ixodid ticks are important in veterinary medicine, primarily as a vector of various pathogenic microorganisms such as protozoan’s ricketisia including babesiosis, anaplasmosis,
Economic losses due to tick and tick-borne diseases was needed. Accordingly, detailed investigation on Ixodid tick and breeding concerns of cattle particularly in small holder’s farms. Ticks on local cattle are treated frequently and seasonal domestic ruminants disease case histories are commonly reported from many farmers around the study area with a suspect of tick infestation. Ticks were collected from each of main body sites and loss of appetite was recorded. Ticks were collected from the “adult” group.

2.4. Tick Collection and Identification Methods

Each sampled animal was subjected to a thorough physical and clinical examination where history, acaricide treatment, any concurrent disease and signs including pain, lameness, and loss of appetite was recorded. Ticks were collected from half body of animals using forceps at main body sites namely: head, dewlap, brisket, belly and back, udder or scrotum, ano-genital, leg and tail during the study period. Adult ticks collected from each of main body sites were maintained in universal bottles separately and then transported to the parasitology laboratory of College of Veterinary Medicine, Haramaya University for identification. Date of collections, place of collections, body sites of collection, and breed of host were recorded. The collected tick was put in to universal bottles containing 70% ethanol. Identification and recording of tick samples were taken place within few hours of collection. Ticks were identified using stereomicroscope following the standard identification procedures described by Nicholson and Butterworth (1986). The samples were taken by random sampling method. The age determination was made according to Aiello and Mays (1998) when calves, less than 6 months old were considered as “young animals” whereas animals more than 6 months old were included in the “adult” group.

2.5. Data Entry and Statistical Analysis

All the data collected in the study period were entered and managed in Microsoft excel ware subsequently analysed using computer soft ware of SPSS version 16. The overall prevalence of tick infestation was determined by dividing the number of ticks collected by the total number of ticks examined.

2.2. Study Animals

The study was conducted on local breed of cattle found in the area and conducted on the total of 384 cattle. The animals were sampled by using randomly sampling method technique from the study site for tick collection and identification from different body region of the animal.

2.3. Study Design

A cross-sectional study was conducted from December 2015 to April 2016 to study the prevalence of ticks and identify major types of tick species in three selected sites of the region namely; Sofi, Dire Teyara and Erer with a total number of 384 cattle. All the animals investigated were categorized in to age, breed and sex groups according to Nicholson and Butterworth (1986). The samples were taken by random sampling method. The age determination was made according to Aiello and Mays (1998) when calves, less than 6 months old were considered as “young animals” whereas animals more than 6 months old were included in the “adult” group.

2.1. Study Area Description

Harari region is located 526 km far from Addis Ababa in East direction at a latitude of 8°50′-9°15′N and longitude of 9°36′N 41°52′ East and situated at an altitude of 1850 masl. The annual rainfall of the area is between 834 and 1300 mm. This area experiences a bimodal rainfall pattern with a long rainy season from June to September and short rainy season from March to April while the annual temperature ranges from 21-26°C. In Harari region there are an estimated amount of around 44,199 cattle, 4130 sheep, 36320 goats and 1400 camel.

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number of positive sample by total sample size and was expressed as percentage. Chi-square test was used to assess statistically significant association in tick infestation between age, breed and sex group.

3. Result

3.1. Overall Prevalence

Out of the 384 animals examined, ticks were found on 229 animals giving an overall prevalence of 59.6% (Table 1).

Table 1. Prevalence of tick in selected areas of Harari region.

<table>
<thead>
<tr>
<th>No. of animal examined</th>
<th>No. of positive animals</th>
<th>No. of negative animals</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>384</td>
<td>229</td>
<td>155</td>
<td>59.6</td>
</tr>
</tbody>
</table>

3.2. Prevalence of Tick Infestation in Cattle by Kebele’s

The overall prevalence of tick infestation in the present study was 59.6%. Slightly higher prevalence was recorded in Sofikebele (62.8%) followed by Dire Teyara with a prevalence of 59.7% (n=71/119) and comparatively lower prevalence was recorded in Ererkebele (55%). There was no significant different between occurrences of infestation in study kebeles (Table 2).

Table 2. Prevalence of tick infestation in cattle by kebeles of the study areas.

<table>
<thead>
<tr>
<th>Kebele</th>
<th>No of animals examined</th>
<th>No of positive</th>
<th>Prevalence (%)</th>
<th>χ²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sofi</td>
<td>156</td>
<td>98</td>
<td>62.8%</td>
<td>1.611</td>
<td>0.447</td>
</tr>
<tr>
<td>Dire Teyara</td>
<td>119</td>
<td>71</td>
<td>59.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erer</td>
<td>109</td>
<td>60</td>
<td>55%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>229</td>
<td>59.6%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.3. Prevalence of Tick Based on Genera Level

Identification of tick genera and their abundance was carried and of the total 1201 Ixodid ticks collected from different body parts (base of the tail, udder and scrotum) of 384 cattle. Four different genera were indentified. The tick genera’s identified were *Rhipicephalus* (29.9%), *Boophilus* (20.8%), *Ambylomma* (38.5%), and *Hyalomma* (10.8%) (Table 3).

Table 3. Distribution of Ixodida tick genera in selected areas of Harari region.

<table>
<thead>
<tr>
<th>Name of tick genera</th>
<th>Total collected ticks samples</th>
<th>No. of positive tick genera</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhipicephalus</td>
<td>1201</td>
<td>359</td>
<td>29.9</td>
</tr>
<tr>
<td>Boophilus</td>
<td>1201</td>
<td>250</td>
<td>20.8</td>
</tr>
<tr>
<td>Amblyomma</td>
<td>1201</td>
<td>462</td>
<td>38.5</td>
</tr>
<tr>
<td>Hyalomma</td>
<td>1201</td>
<td>130</td>
<td>10.8</td>
</tr>
<tr>
<td>Total</td>
<td>1201</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

From the tick genera identified in the study area, *Ambylomma* was the abundant (38.5%) followed by *Rhipicephalus* (29.9%). From the tick genera identified *Hyalomma* was the least abundant (10.8%).

3.4. Prevalence of Tick Infestation in Cattle by Sex and Age

The prevalence of tick infestation in the present study revealed that the occurrence of tick in both sex of animals were not significantly different (p> 0.05) (Table 3). According to the present study findings, there was statistically significant association between age of the animals and level of tick infestation (P=0.032) (Table 4).

Table 4. Prevalence of tick infestation in cattle of the study area by sex and age.

<table>
<thead>
<tr>
<th>Factors</th>
<th>No of animals examined</th>
<th>No of positive Animals</th>
<th>Prevalence</th>
<th>χ²</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>384</td>
<td>229</td>
<td>59.6%</td>
<td>4.61</td>
<td>0.032</td>
</tr>
<tr>
<td>Male</td>
<td>157</td>
<td>93</td>
<td>59%</td>
<td>0.18</td>
<td>0.894</td>
</tr>
<tr>
<td>Female</td>
<td>227</td>
<td>136</td>
<td>59.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>229</td>
<td>59.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>384</td>
<td>229</td>
<td>59.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>83</td>
<td>41</td>
<td>49.4%</td>
<td>4.61</td>
<td>0.032</td>
</tr>
<tr>
<td>Adult</td>
<td>301</td>
<td>188</td>
<td>62.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>229</td>
<td>59.6%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Discussion

This study revealed that ixodid ticks are widespread and most significant external parasites of cattle in the area with an overall 59.6% prevalence that were found to be infested with at least a single tick or more. This finding is relatively in line with previous finding reported by [4] who found 62.04% in Wolayita Zone, Ethiopia. [13] reported 97.8% prevalence which is higher than the current work. The result is in line
with a finding in Humbo by [16] and Wolaita Soddo by [4] in which they found overall prevalence of 61.98% and 65.5% respectively. The highest prevalence of the tick (80%) was reported by [22] in Asela.

_Amblyomma_ is the first widely spread genera with 38.5% prevalence in the study area. The genera are one of the widely distributed cattle tick in Ethiopia [7]. _Amblyomma_ was also frequently encountered by different researchers and it is the most abundant tick’s genera in Bahir Dar [12]. It is a great economic importance because it is an efficient vector of heart water, Nairobi sheep disease and Q-fever [15]. Some species of _Amblyomma_ often leads to ulcer formation because they have long mouth parts with which they can inflict a deep painful bite which may become secondary infection and also has a direct causal relationship with sever clinical dermatophyllosis. Other species of _Amblyomma_ (A. lepidium) was reported by several workers [18]; [19]; [12] in south-western parts of Ethiopia including Gambella and Western Zones of Oromia showing different prevalence. The tick is irregularly dispersed through most parts of the country. It occurs in arid and semi-arid areas and also in woodland, bush land as well as grassland with either trees or bushes present [10].

_Rhipicephalus_ is the second abundant tick species (29.9%) in this study area. This finding was a bit higher than the works conducted by [21] at Ghiwe Tullary in central Ethiopia who reported 21.19% of prevalence. This tick shows an apparent preference for any particular altitude, rainfall or season [18]. It is a possible vector of Babesia, Rickettisa and Theliera [11]. The occurrence of these genera with lower prevalence was reported by other authors [7]; [19]; [20]. _Boophilus_ was found to be the third abundant tick species in the area (20.8%). This result comparatively agrees with the finding reported by [13] at Bedelle district, South Western Ethiopia having 23.7% prevalence. This is not in agreement with [20] who described that _Boophilus_ is the commonest and most wide spread tick in Ethiopia, collected in all administrative regions except in the Afar region. This present finding is also not in line with [22] in Asela, who reported the highest prevalence of _Boophilus_ (80%). The current result disagreed with the findings of [3] at Metekel Ranch, Ethiopia showing prevalence of 5.7%. This difference may be due to the geographical location and altitude factors. The one host ticks of the genus _Boophilus_ that parasitize ruminants represent a hindrance to livestock farming in tropical and sub-tropical countries. They transmit the causative agents to anaplasmosis (“gall sickness”) and babesiosis (“red water”) in cattle [23]. The least prevalent was seen in _Hyalomma_ genera and it accounts 10.8% of the total ticks collected in the study area. This tick species causes abscesses and sloughing of the host skin and it may also be associated with foot-rot of sheep. It is found in sub-Saharan Africa and rift valley and as far as South Africa. This tick species is also commonly found throughout the drier Ethiopia faunal region [15], and highly abundant in low land parts of the country as reported by [12]. [3] at Metekel Ranch, Ethiopia reported _Hyalomma_ prevalence of 5.7%. The mean burden was significantly associated with age of the animals (P=0.032) in that adult animals had significantly higher tick loads than young animals. This is probably associated with decreases in immunity as the animals get older. In this study the prevalence of tick infestation between different Kebeles was 62.8%, 59.7%, and 55% in Sofi, Dire Teyara and Erer Kebeles respectively and the difference was not significant (P>0.05). This is could be due to the same Agro-ecological conditions.

5. Conclusion and Recommendations

According to the present result, 59.6% overall prevalence of tick was observed in the study area. In this study _Amblyommanas_ found to be the most abundant tick genera (38.9%) and the least was _Hyalomma_ (10.8%). Four tick species genera were identified in the study area namely; _Amblyomma_, _Rhipicephalus_, _Boophilus_, and _Hyalomma_. The prevalence on sex bases illustrated that it is higher for females than males. The prevalence rate based on age of the animal also showed that adult animals are more affected than young animals. The result indicates higher prevalence of ticks in the area. This may result in huge loss in hide and skin loss, body weight loss and other economic important factors. Therefore, based on the above conclusion the following recommendations are forwarded:

1. Effective tick control program should be formulated and implemented based on the distribution pattern of ticks and factors responsible for their destruction.
2. Appropriate pasture management in communal grazing area should have to be given a consideration.

Competing Interests

No competing interests existing.

Author Contributions

MM: Conception of the research idea, drafting the manuscript. TD: designing Data collection, interpretation of the results and AW: Data analysis and edition. The author read and approved the final manuscript.

References


