Ixodid ticks infesting cattle and associated risk factors in coastal districts of Odisha

Manaswini Dehuri, Mitra Ranjan Panda, Bijayendranath Mohanty, Ananta Hembram, Trilochan Mahapatra and Adhikari Sahu

Abstract
A study was conducted to investigate the tick infestation on cattle in the coastal district of Odisha from February 2016 to January 2017. During the period of study, 1176 out of 2920 cattle population revealed the presence of ixodid tick infestation. The most prominently infested ixodid tick belonged to *Rhipicephalus (Boophilus) microplus* (24.07%), followed by *Hyalomma anatolicum* (5.6%) and *Hyalomma sanguineum* (1.7%). The study showed that significant (p<0.05) high proportion of ticks were recorded in young cattle (<1 year), indigenous cattle and cattle with poor body condition. The females showed higher infestation than males. The udder (35.03%) and inner thighs (27.55%) were the most common tick predilection site. Month wise prevalence study indicated that animals were infested throughout the year with maximum peak during May to August and lowest during November to January.

Keywords: Ixodid tick, cattle, Odisha, predilection site

1. Introduction
Tick and tick borne pathogens affect 80% of the world’s cattle population and are widely distributed throughout the world, particularly in the tropics and subtropics [1]. The estimated annual global costs associated with ticks and tick-transmitted pathogens in cattle amounts to between US$ 13.9 billion and US$ 18.7 billion [2], while the cost of management of tick and tick borne diseases in livestock of India is as high as US$ 498.7 million per annum [3, 4]. Moreover, apart from transmission of viral, bacterial and protozoan pathogens, feeding by large numbers of ticks causes reduction in live weight and anaemia among domestic animals, while tick bites also reduce the quality of hides and can cause severe dermatitis [5]. In India different researchers have carried out studies on prevalence of ixodid tick infestation in cattle [6-8]. Tick occurrence and tick loads vary with seasons, geographic location, vegetation type, breed, habitation and age of the animal [9]. There is absence of a systematic survey and the tick fauna is yet to be explored in the region, so the study was conducted to know the prevalence and associated risk factors with regards to ixodid ticks in coastal Odisha. This type of survey will be helpful for optimising the existing control measures against ticks as well as the diseases it transmits.

2. Materials and Methods
A total of 2920 cattle selected randomly from different villages in six districts of coastal Odisha were screened for presence of tick infestation for a period of one year (February 2016 to January 2017). These regions are in the north eastern and south eastern zone with hot humid to sub humid climate. The average rainfall in this area is about 1568-1577 mm. The cattle of both sex and varying age groups (<1 year and >1 year) were included in the present study. The animals were carefully examined over their whole body from skin and various other parts including head, belly, back, udder/scrotum, genital regions, leg and tail. Adult ticks and the ticks in various developmental stages were collected from infested animals by using forceps and put into separate glass bottles containing 70% alcohol with 5% glycerol for preservation and labelled with the following data; date of collection, place of collection, body sites of collection, and breed, sex and age of host. Ticks were processed (boiled in KOH, dehydrated in ascending grades of alcohol, cleared, mounted) and identified under a stereomicroscope using the standard identification keys [10, 11]. Statistical analysis was performed on data by SPSS 13.0 software by applying chi-square test and statistical differences (p<0.01 and p<0.05) between various groups were calculated.
3. Results and Discussion
Out of the total 2920 cattle examined for the presence of ticks, 1176 were found to be infested with varying numbers of tick genera leading to an overall prevalence of 40.27% which is quite similar to reports from Jammu and Haryana [12-13] while reports from some other areas showed a much higher prevalence [14-16]. The inconsistency among these studies could be attributed to a wide range of factors including agroecological, animal health practice, or management difference with in their respective study areas. The commonly encountered tick revealed during the study was *Rhipicephalus (Boophilus) microplus* (24.07%; 703/2920) was most abundant, followed by *Hyalomma* (5.6%; 417/2920), *Rhipicephalus* (1.74%; 51/2920) (Figure 1). The dominance of *Rhipicephalus (Boophilus) sp* corroborates with reports from Punjab, Lucknow Jammu and Mathura [7, 8, 12, 14].

The higher tick loads (*p*<0.05) observed in the younger cattle (less than 1 year) is in agreement with earlier studies [7, 12, 16] which may be attributed to lesser application of managerial practices like grooming and acaricide application in case of young animals in comparison to adults. But reports elsewhere [13] have revealed higher infestation in adults which may be imputed to outdoor management and movement of adult animals in search of food and water as compared to younger animals so the exposure opportunity is higher [18]. Our study confirmed that, animals with poor body condition showed significantly (*p*<0.05) higher tick infestation than cattle with normal body condition (Table 1). This may be due to the fact that poorly conditioned animals had low resistant to tick infestation and lack enough body capacity to build resistance whereas animals with good body condition showed reasonable combat to the infestation [19].

Breed was found to be a significant risk factor (*p*<0.05) since our findings showed that tick infestation was higher in crossbreds as compared to indigenous animal. It has been reported that tick resistance is an inherited trait in Bos indicus cattle [20] and indigenous cattle are more resistant to tick infestation than European breeds [21]. The data relating to sex wise prevalence showed higher prevalence in females than males though of no statistical significance as seen in earlier survey [17, 22], which could be due to hormonal stress of milch animal [23]. However few reports [7, 16, 21] contradicts our findings by reporting more prevalence in males attributing it to more interest and care taken by farmer for milch animals. The data with regards to tick predilection site on host body revealed that udder (35.03%) is the highest infested site of tick infestation, followed by inner thighs (27.55%), perineum (8.58%), neck (8.41%), legs (7.73%), ear (7.05%), belly (5.69%) and tail (3.48%) in cattle which supports the earlier studies [24]. The higher tick infestations on the external genitalia and udder could also be ascribed to the fact that ticks prefer warm, moist and hidden sites with a good vascular supply and thin skin [25].

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of cattle examined</th>
<th>No of cattle infected with ticks</th>
<th>Prevalence%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1024</td>
<td>356</td>
<td>34.76</td>
</tr>
<tr>
<td>female</td>
<td>1896</td>
<td>820</td>
<td>43.24</td>
</tr>
<tr>
<td>crossbred</td>
<td>1923</td>
<td>801</td>
<td>41.65</td>
</tr>
<tr>
<td>indigenous</td>
<td>997</td>
<td>375</td>
<td>37.61</td>
</tr>
<tr>
<td>ill body condition</td>
<td>906</td>
<td>393</td>
<td>43.37</td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>1003</td>
<td>431</td>
<td>42.97</td>
</tr>
<tr>
<td>more than 1 year</td>
<td>1917</td>
<td>745</td>
<td>38.86</td>
</tr>
<tr>
<td>Total</td>
<td>2920</td>
<td>1176</td>
<td>40.27</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>χ² (p value)</strong></th>
<th><strong>χ² (p value)</strong></th>
<th><strong>χ² (p value)</strong></th>
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<tbody>
<tr>
<td>0.8</td>
<td>0.013*</td>
<td>0.02*</td>
</tr>
<tr>
<td>0.013*</td>
<td>0.031*</td>
<td></td>
</tr>
</tbody>
</table>

Highly significant** (*p*<0.01); Significant* (*p*<0.05); Nonsignificant (*p*>0.05)
Month wise prevalence study indicated that animals were infested throughout the year with maximum peak during May to August after which there was a declining trend and lowest during November to January (Figure 2) which is in agreement with earlier reports from Uttarakhand and Peshawar [19, 26].

The higher prevalence of ticks during these periods suggests that humidity seems to be a microclimatic factor that influences the infestation rate [6] while during cold weather due to unfavourable condition for survival, the tick passes the winters as engorged females, nymph, larva and unfed adults by hiding in cracks and crevices [27] leading to lower rate of prevalence.

4. Conclusion
As per our present study, it was clearly shown that cattle population in Odisha are considerably burdened with tick parasites leading to a risk of contracting tick-borne diseases. The hot and humid climate of the state provides a conducive environment for the development and propagation of ticks. Moreover, poor animal husbandry practices may be a deterrent in the tick control strategies and programmes. Therefore adoption of adequate sanitary practices as well as proper application of acaricide could help in the tick control under field conditions.

5. Acknowledgement
The authors acknowledge the help and cooperation rendered by the veterinary surgeons and supporting staffs in coastal districts of Odisha for collection of tick samples.

6. References
1. FAO. Tick-borne diseases control Rome 1984; 1.


