Hyalomma impeltatum (Acari: Ixodidae) as a potential vector of malignant theileriosis in sheep in Saudi Arabia

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Received 15 August 2000; received in revised form 8 March 2001; accepted 15 May 2001

Abstract

Little is known about tick-borne diseases in Saudi Arabia, particularly regarding the prevalence of theileriosis in small ruminants. This survey studied the potential vectors of malignant theileriosis in Saudi Arabian sheep. Blood, lymph node and tick samples were collected from animals being treated or necropsied at the Veterinary Diagnostic Laboratory in Jeddah, Makkah (western region), and Bureida, Al-Qasim (central region). Blood and lymph node smears were prepared and examined for Theileria species. Theileria hirci (=T. lestoquardi) was found in lymph node smears of one out of 36 sheep (2.8%) in Jeddah and six of 25 sheep (24%) in Bureida. The erythrocytic forms were detected in 5–8% of RBCs. Ticks were found in relatively less number of sheep in Bureida and Jeddah, 17/180 and 26/125, respectively. All Theileria-infected sheep were infested with Hyalomma impeltatum except the one that carried Hyalomma anatolicum anatolicum. This suggests that H. impeltatum is a potential vector of malignant theileriosis in Saudi Arabia. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Hyalomma impeltatum; Theileria spp.; Sheep-protozoa; Vector; Saudi Arabia

1. Introduction

Sheep production plays an important role in the Saudi Arabian agriculture and culture. Sheep constitute the majority of animal populations in Saudi Arabia. The 1988 census records 6 million sheep, along with another 6 million imported from different parts of the
world. Production is affected by a number of problems which include tick-borne diseases particularly theileriosis.

Malignant theileriosis, caused by *Theileria hirci* (=*T. lestoquardi*), is an economically important disease in small ruminants, particularly in sheep, causing clinical illness and mortalities; it occurs in south-eastern Europe, North Africa, the Near and the Middle East, India and China (Uilenberg, 1997).

In Saudi Arabia, Hussein et al. (1991) recorded *T. hirci* in many parts of the country, and El-Metenawy (1999) found it in Al-Qasim region. Hooshmand-Rad and Hawa (1973a,b) found that *Hyalomma anatolicum anatolicum* is a vector of *T. hirci* and suggested additional investigations to explore if other species of *Hyalomma* could be potential vectors of this parasite.

This work studied a potential vector of malignant theileriosis in local sheep in two geographical areas: one site was in Jeddah, Makkah Province (western region) and the second in Bureida, Al-Qasim Province (central region).

2. Materials and methods

The surveys were conducted at the Veterinary Diagnostic Laboratories in Jeddah and Bureida during March–October 1995. Local sheep (primarily the Najdi breed) being treated or necropsied were examined for ticks, and lymph nodes and blood samples were collected. A total of 305 blood and 61 lymph node smears were stained with Giemsa stain and examined for parasites. Ticks were collected by hand and preserved in 70% alcohol for later identification.

Animals were considered to be infected with *T. hirci* when they showed severe illness and symptoms corresponding with malignant theileriosis as well as when abundance of schizonts were seen in lymph node smears and low parasitaemia was detected in the blood (Hooshmand-Rad and Hawa, 1973b).

3. Results

*T. hirci* schizonts were found in lymph node smears of 2.8% (*n* = 36) of sheep in Jeddah and 24% (*n* = 25) of sheep in Bureida (Table 1). Two of the seven infected sheep presented typical signs of ovine theileriosis. These included fever, listlessness, weakness, enlargement

<table>
<thead>
<tr>
<th>Locality</th>
<th>No. of animals necropsied</th>
<th>No. of positive lymph node smears</th>
<th>% of positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeddah</td>
<td>36</td>
<td>1</td>
<td>2.8</td>
</tr>
<tr>
<td>Bureida</td>
<td>25</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>7</td>
<td>17</td>
</tr>
</tbody>
</table>
Table 2
Species and number of ticks collected on 26 sheep in Jeddah and 17 sheep in Bureida

<table>
<thead>
<tr>
<th>Tick species</th>
<th>No. of ticks in Jeddah</th>
<th>Average no. of ticks/animal</th>
<th>No. of ticks in Bureida</th>
<th>Average no. of ticks/animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. dromedarii</td>
<td>11 (3)a</td>
<td>3.7</td>
<td>2 (1)</td>
<td>2.0</td>
</tr>
<tr>
<td>H. a. anatolicum</td>
<td>11 (4)</td>
<td>2.8</td>
<td>8 (3)</td>
<td>2.7</td>
</tr>
<tr>
<td>H. impeltatum</td>
<td>7 (3)</td>
<td>2.3</td>
<td>88 (12)</td>
<td>7.3</td>
</tr>
<tr>
<td>R. turanicus</td>
<td>93 (15)</td>
<td>6.2</td>
<td>1 (1)</td>
<td>1.0</td>
</tr>
<tr>
<td>R. e. evertsi</td>
<td>1 (1)</td>
<td>1.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>123 (26)</td>
<td>4.7</td>
<td>99 (17)</td>
<td>5.8</td>
</tr>
</tbody>
</table>

a Number of infested animals.

of the superficial lymph nodes, icterus and dyspnea. The other five infected sheep had mixed infection with other diseases such as peste des petits ruminants (PPRs), caseous lymphadenitis and salmonellosis. Only 5–8% of RBCs were parasitized with *Theileria* in infected sheep.

Based on the clinical signs, low parasitaemia and on the presence of schizonts in lymph node smears, the causative species was determined to be *T. hirci*.

Ticks were found in relatively low numbers on 9.4% (*n* = 180) and 20.8% (*n* = 125) of sheep in Bureida and Jeddah, respectively (Table 2). All *Theileria*-infected sheep were infested with *Hyalomma impeltatum* ticks, except for the one that carried *H. a. anatolicum*.

4. Discussion

Malignant theileriosis has been recorded in many countries, including Turkey (Sayin et al., 1997), Iran (Hashemi-Fesharki, 1997), Iraq (Latif et al., 1977), Sudan (Latif, 1997) and in Saudi Arabia (Hussein et al., 1991; El-Metenawy, 1999). The disease may also occur in other countries in the Arabian Peninsula. In Jordan (Sherkov et al., 1977) and Israel (Pipano, 1991), *T. hirci* has not been recorded; however, *Theileria ovis*, the causative agent of benign theileriosis, has been encountered during blood smear examinations. In Egypt, although *Theileria* has been recorded in small ruminants, its species as well as its vector have not been determined. However, based on anecdotal reports from veterinary clinics, which report no mortalities or severe illness accompanying *Theileria* infection in sheep and goat flocks, it is suggested that the *Theileria* species infecting ovines in Egypt is *T. ovis*.

Despite the high economic importance of malignant theileriosis in small ruminants, it has been much less thoroughly studied than bovine theileriosis (Friedhoff, 1997). This is especially true in Saudi Arabia where little attention is paid to the disease and veterinary care remains inadequate for combating it when compared to bovine theileriosis. This could be attributed to the fact that bovine theileriosis is higher in prevalence and is more frequently encountered in cattle than malignant theileriosis encountered in sheep. This is a reflection of the relative abundance of the tick vector population on livestock in Saudi Arabia where tick infestations are much higher in cattle than in sheep (El-Azazy and Scrimgeour, 1997).

In this study, the prevalence of tick infestation was low in sheep, probably because of the extensive management system under which the great majority of these animals are reared.
Sheep and goats are kept in flocks roaming the desert for grass and water without staying in one place for a long time which minimizes the risk of infestation by ticks.

In the western region of Saudi Arabia, *Rhipicephalus turanicus* was found to be the predominating tick species on sheep in this study. These findings support those reported by Al-Khalifa et al. (1987). However, this study revealed that *H. impeltatum* was predominant on sheep in Al-Qasim where Al-Khalifa et al. (1983) recorded no ticks on small ruminants. This could have been due to the small number of animals examined by them.

In India, *T. hirci* was experimentally transmitted to sheep by *H. a. anatolicum* and *Rhipicephalus* spp.; however, the *Rhipicephalus* spp. were not identified (Sisodia and Gautam, 1983). In China, *Haemaphysalis qinghaiensis* has been incriminated as a vector of *T. hirci* (Jianxun and Hong, 1997). In the Middle East, *H. a. anatolicum* has been recognized as the vector. In this study, *H. impeltatum* was found on the majority of *Theileria*-infected sheep, suggesting that this tick species could be a vector of malignant theileriosis in Saudi Arabia.

It is of interest to note that in the eastern and northern regions of Saudi Arabia, Diab et al. (1987) found that sheep were important hosts of *H. impeltatum*. Hussein et al. (1991) recorded the highest prevalence rate of *T. hirci* in small ruminants in these regions. These observations support our conclusion that *H. impeltatum* could be a vector of *T. hirci* in Saudi Arabia.

More investigations are needed on the ecology of vectors of malignant theileriosis in small ruminants in order to plan appropriate control measures. Veterinarians should be aware of the occurrence of the disease, especially as its symptoms may be confused with some infectious diseases such as PPR, which is highly prevalent in Saudi Arabia.

Acknowledgements

The authors are grateful to Dr. E.A. Dykstra, Head of Vector Biology Research Program, NAMRU-3, Cairo, Egypt for her help in revising the manuscript.

References


