THEILERIA INFECTIVITY OF HYALOMMA TICKS IN HARYANA, INDIA

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SUMMARY

Theileria infection of Hyalomma ticks collected from three districts of Haryana was assessed in whole salivary glands by the methyl-green pyronin staining method. Of 1,662 ticks screened, 546 (32.8%) were found Theileria positive. Infection rate in 935 female ticks (36.9%) was more than that of 727 male ticks (27.6%). Density of Theileria infection (number of infected acini per infected tick) was also higher in female ticks. Theileria infection rate of ticks varied greatly in the three districts viz. only 12.0% in Rohtak, 25.8% in Hisar and 48.3% in Karnal. Per cent infection rate was high (63.7%) in ticks from indigenous cattle and low (18.6%) in those collected from buffaloes. However, the intensity of infection in infected ticks from cross-bred cattle was comparatively much higher. Frequency distribution of Theileria positive acini in infected ticks revealed a low density of infection per infected tick. This points to the largely stable endemic situation prevailing in Haryana. Only a single salivary acinus was found infected in 16.6% of the infected ticks, about 70% had up to 10 infected acini while only about 10% had over 25 infected acini per tick. The masses in acini presumed to be Theileria were confirmed by demonstrating parasitic masses on staining one of a pair of salivary glands and inoculating the suspension of the other half of the gland into two cross-bred cow calves which developed clinical signs and lesions typical of theileriosis.

INTRODUCTION

Although bovine tropical theileriosis is widespread in India and is a serious challenge to the livestock improvement programme (Uilenberg, 1982) its epidemiology has not been adequately studied. Because of different tick vectors with different biology from one region to another the epidemiology of tropical theileriosis will not be the same everywhere (Uilenberg, 1976). The detection of Theileria infection rates in the vector ticks is a component in the study of the epidemiology of theileriosis. Work on this aspect had been initiated with T. parva in Kenya (Walker, Young and Leitch, 1981) and with T. annulata in Sudan (Walker, Latif, Morzaria and Jongejan, 1983). Since this new approach has not been explored so far in India the present study was undertaken in Haryana where theileriosis is known to be endemic (Gautam, Sharma and Kalra, 1970).

MATERIALS AND METHODS

Ticks were collected from three districts of Haryana representing three different agroclimatic conditions namely relatively arid (Hisar), relatively wet (Karnal) and in between these two (Rohtak). In Hisar district the ticks were collected from villages and from Hisar city (29°10'N, 75°46'E); in Karnal district the collection sites comprised villages around Karnal city (29°43'N, 76°58'E) and the vicinity of the city while in Rohtak district the collections were made from villages around Beri town (28°30'N, 76°14'E).
Unfed adult ticks and moulting nymphs were collected from the cracks and crevices of animal houses by digging out from underneath the mud-plaster of cutcha (non-concrete) walls up to a height of four feet. Apart from the unfed adults the engorged nymphs were also collected from cattle and buffaloes by tying ear bags to those animals which were having feeding nymphs on their ears. The engorged nymphs thus collected were kept at 28°C and 80% relative humidity until moulting. After allowing 72 hours prefeeding on a rabbit these ticks were dissected according to the procedure described by Till (1961). The salivary glands were stained with methyl green and pyronin stain as per Irvin, Boarer, Dobbelrae, Mahan, Masake and Ocama (1981).

For confirming the identity of the parasites detected by the staining procedure 20 salivary glands suspected to be Theileria infected on the basis of hypertrophied acini in unstained preparations were tested. While one half of each gland was stained and examined microscopically for infectivity the other halves were pooled and ground into a homogenate in working solution of tissue culture media (Gill, Bhattacharyulu and Kaur, 1977). Two Theileria-free susceptible cross-bred cow calves were inoculated, each with the homogenates of 20 half salivary glands. The clinical and parasitological manifestations of the calves were recorded.

**RESULTS**

Theileria infected salivary glands were identified in unstained preparations by the presence of hypertrophied, opaque acini and in stained preparations by the hypertrophy of the acinus and acinar cell nuclei along with the presence of diffuse theilerial masses. The nucleus of the acinus and the chromatin particles of the Theileria parasites stained greenish blue while the cytoplasm of the acinus stained light pink. Out of a total of 1,662 ticks examined for Theileria 1,650 were H. a. anatolicum and only 12 were H. dromedarii. No H. dromedarii tick was found Theileria infected while 546 (32.8%) H. a. anatolicum ticks had Theileria masses in them. Among the 935 female ticks examined 345 (36.9%) were found Theileria infected while the infectivity in 727 male ticks amounted to 201 (27.6%).

A total of 818 ticks were examined from Hisar and 211 (25.8%) of them were Theileria infected. From Karnal 644 ticks were examined and 311 (48.3%) of them were infected. Of a total of 200 ticks examined from Rohtak 24 (12.0%) were Theileria infected (Table I). The frequency distribution of Theileria infected acini per infected tick is expressed in (Table II). The density of Theileria infection in ticks detached from indigenous cattle, cross-bred cattle, buffaloes and those collected from soil revealed a higher density of infection in ticks from cross-bred cattle and buffaloes while a low density of infection was detected in indigenous

**Table I**

<table>
<thead>
<tr>
<th>Locality</th>
<th>Total ticks examined</th>
<th>Theileria infected ticks (%)</th>
<th>Highest No. of infected acini in a single infected tick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hisar</td>
<td>818</td>
<td>211 (25.8)</td>
<td>441</td>
</tr>
<tr>
<td>Karnal</td>
<td>644</td>
<td>311 (48.3)</td>
<td>372</td>
</tr>
<tr>
<td>Rohtak</td>
<td>200</td>
<td>24 (12.0)</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>1662</td>
<td>546 (32.8)</td>
<td>441</td>
</tr>
</tbody>
</table>